Club Car®

2005
PRECEDENT

Maintenance And Service

Ingersoll-Rand

IQ System
Electric Vehicles

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FOREWORD

Club Car vehicles are designed and built to provide the ultimate in performance efficiency; however, proper maintenance and repair are essential for achieving maximum service life and continued safe and reliable operation.

This manual provides detailed information for the maintenance and repair of the electric Precedent vehicles, and should be thoroughly reviewed prior to servicing the vehicle. The procedures provided herein must be properly implemented, and the DANGER, WARNING, and CAUTION statements must be heeded.

This manual was written for the trained technician who already possesses knowledge and skills in electrical and mechanical repair. If the technician does not have such knowledge and skills, attempted service or repairs to the vehicle may render the vehicle unsafe. For this reason, Club Car advises that all repairs and/or service be performed by an authorized Club Car distributor/dealer representative or by a Club Car factory-trained technician.

It is the policy of Club Car, Inc. to assist its distributors and dealers in continually updating their service knowledge and facilities so they can provide prompt and efficient service for vehicle owners. Regional technical representatives, vehicle service seminars, periodic service bulletins, maintenance and service manuals, and other service publications also represent Club Car's continuing commitment to customer support.

This manual covers all aspects of typical vehicle service; unique situations, however, do sometimes occur when servicing a vehicle. If it appears that a service question is not answered in this manual, you may write to us at: Club Car, Inc.; P.O. Box 204658; Augusta, Georgia 30917; Attention: Technical Services, or contact a Club Car Technical Service Representative at (706) 863-3000, ext. 3580.

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This manual effective August 2, 2004.

⚠ WARNING

- **Read Section 1 – Safety before attempting any service on the vehicle.**
- **Before servicing vehicle, read complete section(s) and any referenced information that may be relevant to the service or repair to be performed.**

NOTE: *This manual represents the most current information at the time of publication. Club Car, Inc. is continually working to further improve its vehicles and other products. These improvements may affect servicing procedures. Any modification and/or significant change in specifications or procedures will be forwarded to all Club Car dealers and will, when applicable, appear in future editions of this manual.*

Club Car, Inc. reserves the right to change specifications and designs at any time without notice and without the obligation of making changes to units previously sold.

There are no warranties expressed or implied in this manual. See the limited warranty found in the vehicle owner's manual or write to Club Car, Inc., P.O. BOX 204658, Augusta, Georgia 30917-4658 USA, Attention: Warranty Department.

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SECTION i – INDEX

SECTION 1 – SAFETY

To ensure the safety of those servicing Club Car vehicles, and to protect the vehicles from possible damage resulting from improper service or maintenance, the procedures in this manual must be followed.

It is important to note that throughout this manual there are statements labeled DANGER, WARNING, or CAUTION. These special statements relate to specific safety issues, and must be read, understood, and heeded before proceeding with procedures. There are statements labeled NOTE, which provide other essential service or maintenance information.

⚠ DANGER

- **A DANGER indicates an immediate hazard that will result in severe personal injury or death.**

⚠ WARNING

- **A WARNING indicates an immediate hazard that could result in severe personal injury or death.**

⚠ CAUTION

- **A CAUTION with the safety alert symbol indicates a hazard or unsafe practice that could result in minor personal injury.**

CAUTION

- **A CAUTION without the safety alert symbol indicates a potentially hazardous situation that could result in property damage.**

GENERAL WARNINGS

The following safety statements must be heeded whenever the vehicle is being operated, repaired, or serviced. Other specific safety statements appear throughout this manual and on the vehicle.

⚠ DANGER

- **Battery – Explosive gases! Do not smoke. Keep sparks and flames away from the vehicle and service area. Ventilate when charging or operating vehicle in an enclosed area. Wear a full face shield and rubber gloves when working on or near batteries.**
- **Battery – Poison! Contains acid! Causes severe burns. Avoid contact with skin, eyes, or clothing. Antidotes:**
  - **External: Flush with water. Call a physician immediately.**
  - **Internal: Drink large quantities of milk or water. Follow with milk of magnesia or vegetable oil. Call a physician immediately.**
  - **Eyes: Flush with water for 15 minutes. Call a physician immediately.**

⚠ WARNING

- **Only trained technicians should service or repair the vehicle or battery charger. Anyone doing even simple repairs or service should have knowledge and experience in electrical and mechanical repair. The appropriate instructions must be used when performing maintenance, service, or accessory installation.**
- **Follow the procedures exactly as stated in this manual, and heed all DANGER, WARNING, and CAUTION statements in this manual as well as those on the vehicle and battery charger.**
- **Lift only one end of the vehicle at a time. Use a suitable lifting device (chain hoist or hydraulic floor jack) with 1000 lb. (454 kg) minimum lifting capacity. Do not use lifting device to hold vehicle in raised position. Use approved jack stands of proper weight capacity to support the vehicle and chock the wheels that remain on the floor. When not performing a test or service procedure that requires movement of the wheels, lock the brakes.**
- **Improper use of the vehicle or failure to properly maintain it could result in decreased vehicle performance, severe personal injury, or death.**
- **Any modification or change to the vehicle that affects the stability or handling of the vehicle, or increases maximum vehicle speed beyond factory specifications, could result in severe personal injury or death.**
- **Check the vehicle for proper location of all vehicle safety and operation decals and make sure they are in place and are easy to read.**
- **Wear safety glasses or approved eye protection when servicing the vehicle or battery charger. Wear a full face shield and rubber gloves when working on or near batteries.**
- **Do not wear loose clothing or jewelry such as rings, watches, chains, etc., when servicing the vehicle or battery charger.**
- **Use insulated tools when working near batteries or electrical connections. Use extreme caution to avoid shorting of components or wiring.**
- **Prior to leaving the vehicle unattended or servicing the vehicle, turn the key switch OFF, remove the key, and place the Forward/Reverse switch in the NEUTRAL position. Chock the wheels when servicing the vehicle.**
- **Place Tow/Run switch in the TOW position before disconnecting or connecting the batteries. Failure to heed this warning could result in a battery explosion or severe personal injury.**
- **To avoid unintentionally starting the vehicle, disconnect the batteries as shown (Figure 1-1).**
- **After disconnecting the batteries, wait 90 seconds for the controller capacitors to discharge.**
- **Do not leave children unattended on vehicle.**

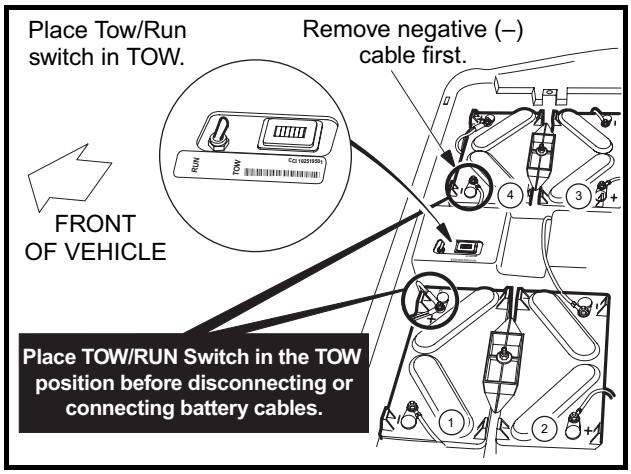

Figure 1-1 Battery Disconnection

SECTION 2 – VEHICLE SPECIFICATIONS

SPECIFICATIONS	Two-Passenger Electric Vehicle	Four-Passenger Electric Vehicle
POWER SOURCE		
Drive motor: Direct drive, 48 volts DC, shunt-wound, 3.2 hp	•	•
Transaxle: Double reduction helical gear with 12.3:1 direct drive axle	•	•
Electrical system: 48 volts DC, reduced speed reverse	•	•
Batteries: High capacity, deep cycle, 12 volt	•	•
Charger: Automatic, 48-volt; UL and CSA listed	•	•
Engine: 4-cycle OHV, 286 cc, 9.0 hp rated, single-cylinder, air-cooled, with pressure lubrication system		
Fuel system: Side-draft carburetor with float bowl, fixed jets, fuel filters, and impulse fuel pump		
Governor: Automatic ground-speed sensing, internally geared in unitized transaxle		
Ignition: Transistor electronic ignition with electronic RPM limiter		
Unitized transaxle: Fully synchronized forward and reverse with neutral and reduced speed reverse (11.8:1 forward, 17.1:1 reverse)		
Torque converter: Automatic, variable-speed, dry type		
Electrical system: 12 volt, 500 cca at 0 °F (-17.8 °C), 650 at 32 °F (0 °C). 105-minute reserve capacity and 35-amp charging capacity		
STEERING/SUSPENSION/BRAKES		
Steering: Self-adjusting rack and pinion	•	•
Suspension: Front and rear tapered mono-leaf springs with dual hydraulic shocks	•	•
Brakes: Dual rear wheel self-adjusting brakes with cast iron drums and single brake pedal with automatic-release park brake	•	•
BODY/CHASSIS		
Frame/Chassis: Aluminum and composite	•	•
Front and rear body: Dupont Surlyn© Reflections	•	•
Body finish: High-gloss molded-in color	•	•
Tires: 18 x 8.5 – 8 tubeless, 4 ply rated	•	•
DIMENSIONS/WEIGHT		
Overall length	91.5 in. (232 cm)	104 in. (264 cm)
Overall width	47.25 in. (120 cm)	47.25 in. (120 cm)
Overall height (with canopy)	68.5 in. (174 cm)	71 in. (180 cm)
Overall height (at steering wheel)	48.0 in. (122 cm)	48.0 in. (122 cm)
Wheelbase	65.5 in. (166 cm)	65.5 in. (166 cm)
Ground clearance	4.5 in. (11 cm)	4.5 in. (11 cm)
Front wheel tread	34.5 in. (88 cm)	34.5 in. (88 cm)
Vehicle Specifications continued on next page...		

SPECIFICATIONS	Two-Passenger Electric Vehicle	Four-Passenger Electric Vehicle
Rear wheel tread	38.6 in. (98 cm)	38.6 in. (98 cm)
Weight (standard electric vehicle with canopy, with batteries)	855 lb. (388 kg)	970 lb. (440 kg)
Weight (standard gasoline vehicle with canopy, with battery, without fuel)		
Forward speed	12-15 mph (19-24 km/h)	
Curb clearance circle (diameter)	17 ft - 4in. (528 cm)	17 ft - 4 in. (528 cm)
Standard seating capacity	2	4
LIQUID CAPACITIES		
Transaxle	22 oz. (.67 liters)	22 oz. (.67 liters)
Engine crankcase (without filter)		
Engine crankcase (with filter)		
Unitized transaxle		
Fuel tank		
TIRE PRESSURE		
Front and rear	18-20 psi (1.24-1.38 bars)	18-20 psi (1.24-1.38 bars)

SECTION 3 – GENERAL INFORMATION

⚠ DANGER

- **See General Warnings, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warnings, Section 1, Page 1-1.**

Important features unique to the different models covered in this manual are highlighted. Club Car, Inc. recommends the owner/operator read and understand this manual and pay special attention to features specific to their vehicle(s).

Refer to the owner's manual provided with the vehicle for information on the following topics:

- Pre-Operation and Daily Safety Checklist
- Controls and Indicators
- Driving Instructions
- Towing
- Transporting on a Trailer
- Subsequent Owner Registration
- Warranties

SERIAL NUMBER IDENTIFICATION

The serial number of the vehicle is printed on a bar code decal mounted on the passenger side inner dash **(Figure 3-1)**.

NOTE: *Always have the vehicle serial number available when ordering parts or making inquiries.*

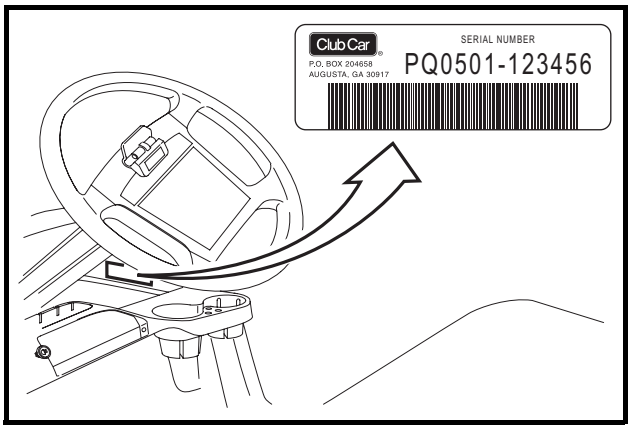

Figure 3-1 Serial Number Decal

SAFETY COMMITTEE

If the golf car is to be rented or is part of a fleet, we strongly recommend that a safety committee be appointed. One of the main concerns of this committee should be the safe operation of the golf cars.

This should include at a minimum:

- Where golf cars should be driven.
- Ensuring that proper warnings of driving hazards are displayed and visible. See below for list of signs available from Club Car Service Parts Department.
- Who should and who should not drive golf cars.
- Instructing first time drivers.
- Maintaining golf cars in a safe driving condition
- How various rules are to be enforced.

The safety committee should include all these items and such others as the committee feels necessary or appropriate. Warning signs available from Club Car are listed below.

WARNING SIGN	CCI P/N
Sharp Left	S9911211
Sharp Right	S9921211
Steep Hill	S9931211

STORAGE

See General Warnings, Section 1, Page 1-1.

⚠ WARNING

- **Turn the key switch OFF, remove the key, and leave the Forward/Reverse switch in the NEUTRAL position during storage. This is to prevent unintentionally starting the vehicle or a fire hazard.**
- **Do not attempt to charge frozen batteries or batteries with bulged cases. Discard the battery. Frozen batteries can explode.**

⚠ CAUTION

- **Batteries in low state of charge will freeze at low temperatures.**
- **To avoid exposing electrical components to moisture and subsequent damages, do not use any type of pressure washing or steam cleaning equipment to wash the vehicle.**
- **Place Tow/Run switch in the TOW position.**

PREPARING THE ELECTRIC VEHICLE FOR EXTENDED OFF-SEASON STORAGE

1. Fully charge batteries. **See Section 13 – Batteries.**

2. Batteries should be clean and free of corrosion. Wash tops and terminals of batteries with a solution of baking soda and water (1 cup (237 mL) baking soda per 1 gallon (3.8 L) of water). Rinse solution off batteries. Do not allow this solution to enter the batteries. Be sure terminals are tight. Let the terminals dry and then coat them with Battery Terminal Protector Spray (CCI P/N 1014305).

3. Store vehicle in a cool, dry place. This will minimize battery self-discharge.

4. Adjust tires to recommended tire pressure. **See Section 2 – Vehicle Specifications.**

5. Perform all semiannual periodic lubrication. **See Periodic Lubrication Schedule, Section 10, Page 10-3..**

6. Thoroughly clean front body, rear body, seats, battery compartment, and underside of vehicle.

7. Do not engage the park brake. Chock the wheels to prevent the vehicle from rolling.

8. Keep batteries fully charged during storage.

- Leave chargers plugged in during storage. The onboard computer will automatically activate the charger when necessary. If the battery charger is left plugged in during extended storage, the electrolyte should be checked monthly to ensure that proper level is maintained. AC power should also be checked periodically.

- If charger cannot remain plugged in, or AC power will not be available during extended storage, disconnect the batteries for storage. See WARNING “To avoid unintentionally starting...” in **General Warnings, Section 1, Page 1-1.**

CAUTION

- **Check the vehicle monthly to ensure the charger is operating correctly during storage.**

RETURNING THE STORED ELECTRIC VEHICLE TO SERVICE

1. If necessary, connect batteries.
2. Fully charge batteries.

⚠ WARNING

- **Do not attempt to charge frozen batteries or batteries with bulged cases. Discard the battery. Frozen batteries can explode.**

3. Adjust tire to recommended pressure. **See Section 2 – Vehicle Specifications.**
4. Perform the Pre-Operation and Daily Safety Checklist. **See Section 10 – Periodic Maintenance.**

SECTION 4 – BODY AND TRIM

⚠ DANGER

- **See General Warnings, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warnings, Section 1, Page 1-1.**

CLEANING THE VEHICLE

See General Warnings, Section 1, Page 1-1.

CAUTION

- **Do not use detergents or cleaning solvents that contain ammonia, aromatic solvents, or alkali materials on body panels or seats.**
- **Do not allow battery acid to drip on body panels. Battery acid will cause permanent damage. Wash spilled battery acid from body panels immediately.**

Club Car Precedent vehicles are equipped with Surlyn® front and rear bodies. Use only commercially available automotive cleaners with a sponge or soft cloth for normal cleaning. A garden hose at normal residential water pressure is adequate.

Club Car does not recommend any type of pressure washing or steam cleaning. Such a process (especially if the vehicle has a Surlyn rear body that is removed) will expose electrical components to moisture. Moisture entering electrical components can result in water damage and subsequent component failure.

Use non-abrasive wax products. Do not use abrasive leveling or rubbing compounds; these will permanently dull the gloss. Battery acid, fertilizers, tars, asphalt, creosote, paint, or chewing gum should be removed immediately to prevent possible stains. **See following CAUTION and NOTE.**

CAUTION

- **Use of leveling or rubbing compounds will permanently dull finish of vehicle.**
- **Do not apply wax products to the black plastic material of the front and rear underbody, the front bumper, or the textured area of the rear beauty panel marked "NO STEP." Wax will cause these surfaces to become discolored.**

NOTE: *Dispose of waste water properly.*

SEAT

To preserve seat appearance, clean regularly with mild soap or detergent applied with a sponge or soft cloth. Use a soft bristle brush to clean areas that are especially soiled. Use the following guidelines:

Light Soiling: A solution of 10% liquid dish soap and warm water applied with a soft, damp cloth is recommended. A soft bristle brush may be used if necessary. Wipe off any residue with a water dampened cloth.

Difficult Stains: Dampen a soft, white cloth with a solution of 10% household bleach (sodium hypochlorite) and 90% water. Rub gently to remove stain, then rinse with a water dampened cloth to remove bleach concentration.

More Difficult Stains: Perform previous procedure using full-strength bleach, or allow bleach to puddle on affected area for approximately 30 minutes. Rinse with a water dampened cloth to remove any remaining bleach concentration.

CAUTION

- **To prevent damage to the vehicle when removing difficult stains or heavy soiling, remove the seat bottom from the vehicle first.**

FRONT AND REAR BODY REPAIR

See General Warnings, Section 1, Page 1-1.

STRESS LINES OR STREAKS

Repeatedly flexing the Surlyn body can cause white stress lines or streaks in the finish. To remove them:

1. Hold a heat gun 12 inches (30 cm) away from the affected area, with the gun on its lowest heat setting.
2. Slowly wave the heat gun back and forth over the affected area until the streak fades.
3. It may be necessary to move the gun closer to the body to fade the streak, but under no circumstance should the gun be held closer than 6 inches (15 cm) to the body.

CAUTION

- **Holding the heat gun too close to the body could melt the body or damage the finish.**

MINOR IMPACT DAMAGE/DEFORMATIONS

Minor impact damage to a Surlyn body can be repaired using a procedure similar to the one used to remove stress lines. To remove deformations resulting from minor impact damage:

1. Hold a heat gun 12 inches (30 cm) away from the affected area, with the gun on its lowest heat setting.
2. Periodically remove the heat gun and bend the body, using a push block, in the opposite direction of the deformation.
3. Continue heating and bending the body until the original shape returns. Under no circumstance should the gun be held closer than 6 inches (15 cm) to the body. **See preceding CAUTION.**

MINOR SCRATCHES AND SURFACE BLEMISHES

For minor scratches or blemishes in the Surlyn body that do not penetrate the finish:

1. Thoroughly clean the affected area using a strong, non-abrasive detergent and hot water, then clean with Ultra-Kleen® Solvent Cleaner to remove any oil-based contaminants.
2. Lightly buff imperfection with a clean soft cloth or buff pad. Do not use any kind of rubbing (abrasive) compound on body assemblies.
3. Wax the entire body part to restore luster and weather protection.

GOUGES, PUNCTURES, TEARS, LARGE SCRATCHES, AND ABRASIONS

Touch-up is not recommended. Replace the entire body part or have it repaired by a professional paint and body repair shop with experience repairing Surlyn bodies.

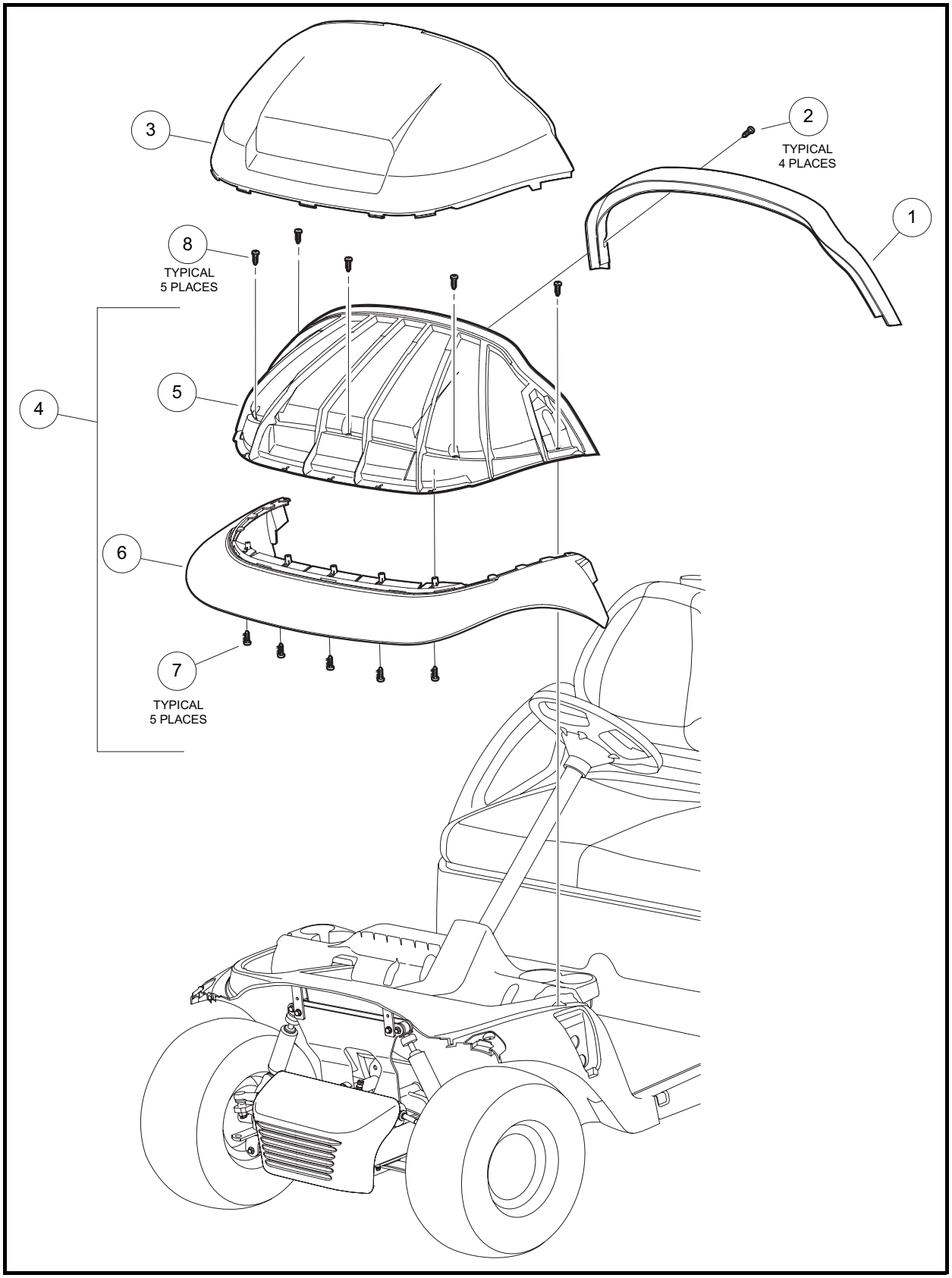

Figure 4-1 Front Body

FRONT BODY

See General Warnings, Section 1, Page 1-1.

FRONT BODY REMOVAL

1. Remove the four screws (2) and pull the brow cap (1) from the brow and fascia assembly (4) **(Figure 4-1, Page 4-3)**.
2. Pull the front beauty panel (3) up and away from the brow and fascia assembly (4), disengaging the snap tabs.
3. If the vehicle is equipped with a canopy, loosen the canopy support cover then loosen, but do not remove, the front canopy support bolts. If there is no canopy, remove the non-canopy cover.
4. Remove the five screws (8) and lift the brow and fascia assembly (4) from the front underbody.
5. Remove the five screws (7) to separate the front fascia (6) from the brow (5).

FRONT BODY INSTALLATION

1. Install fascia (6) to brow (5) with five screws (7). Tighten screws to 3.3 ft-lb (4.5 N·m) **(Figure 4-1, Page 4-3)**.
2. Install brow and fascia assembly (4) to front underbody with five screws (8). Tighten screws to 1.8 ft-lb (2.5 N·m).
3. Install front beauty panel (3) over brow (5). Tabs on the forward edge of the front beauty panel should fit into slots between the fascia and the brow.
4. Position brow cap (1) to cover the edge of both the brow (5) and the front beauty panel (3). Secure brow cap (1) with four screws (2). Tighten screws to 3.3 ft-lb (4.5 N·m).

FRONT BUMPER

The underbody bracket (1) connects the front suspension to the front underbody **(Figure 4-2, Page 4-5)**. Each bracket is secured in place by two taptite screws (2) tightened to 13 ft-lb (17.6 N·m).

The front bumper (3) is attached to the vehicle frame rails by nuts (5) and bolts (4). The nuts (5) need to go on top of the bumper attaching brackets, always insert the bolts (4) through the bottom. The nuts are tightened to 13.3 ft-lb (18 N·m).

INSTRUMENT PANEL

See General Warnings, Section 1, Page 1-1.

INSTRUMENT PANEL REMOVAL

1. Remove two screws (5) at sides and one screw (4) on top of instrument panel (3) **(Figure 4-3, Page 4-5)**.
2. Tilt instrument panel up to release it from the dash assembly (1).
3. Disconnect the electrical connector on the passenger side of the instrument panel (3) and remove the panel.
4. Remove two barrel fasteners (7) to release dash tray (6).
5. Remove three screws (2) and remove dash assembly (1) from vehicle.

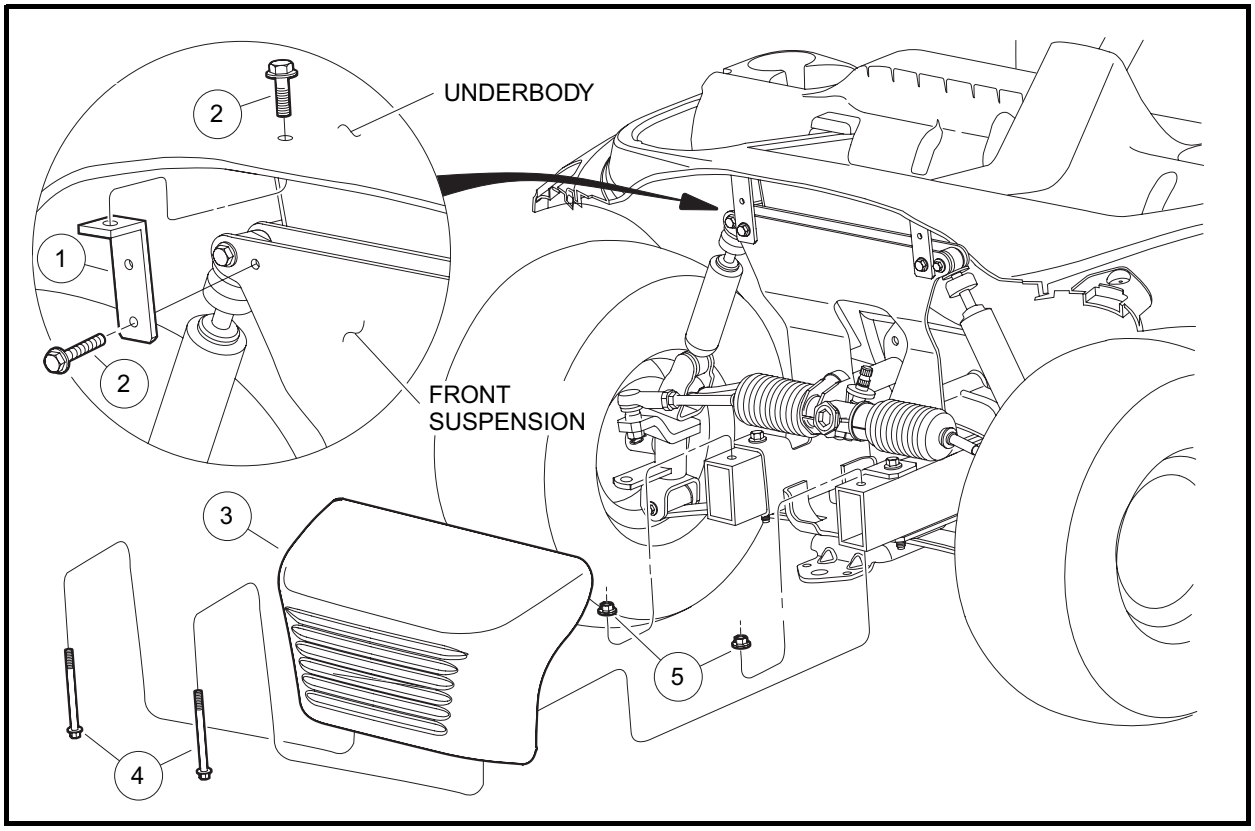

Figure 4-2 Bracket and Front Bumper

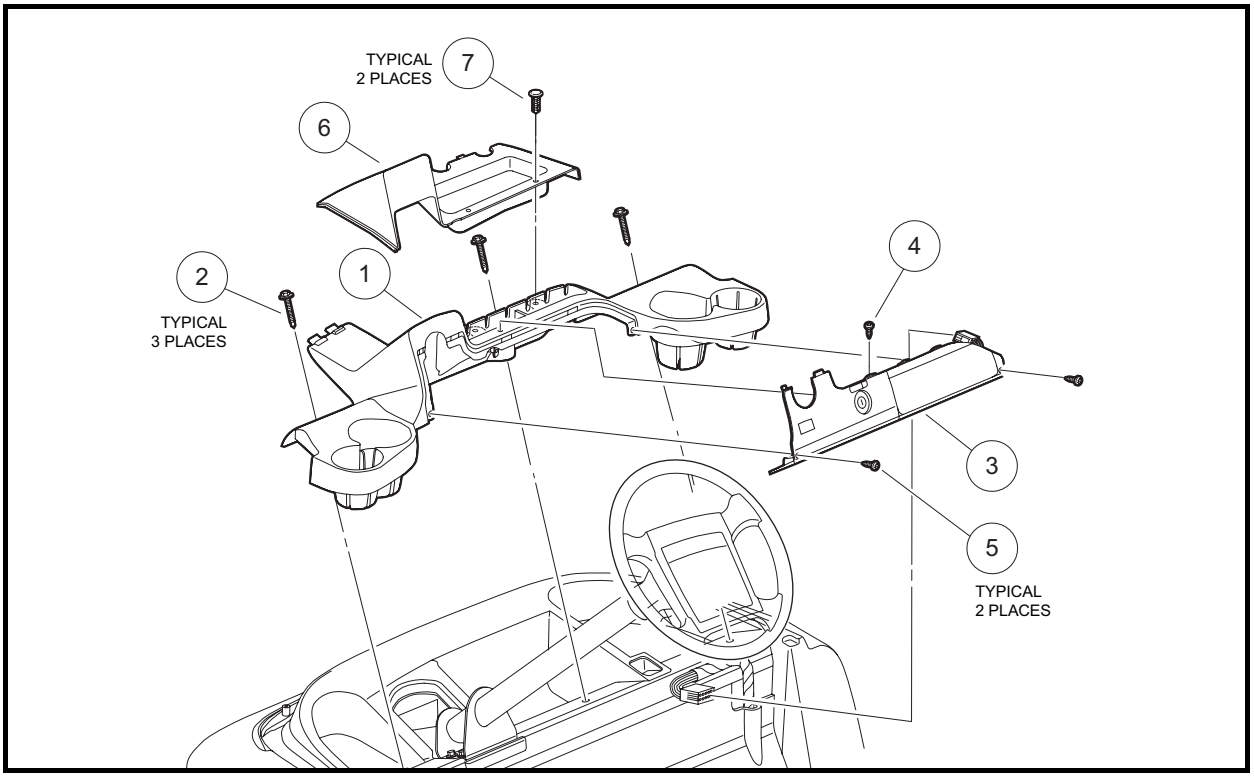

Figure 4-3 Instrument Panel

INSTRUMENT PANEL INSTALLATION

1. Position dash assembly (1) on vehicle. Make sure tabs on the forward edge engage to front underbody. Secure assembly in place with three screws (2) **(Figure 4-3, Page 4-5)**. Tighten screws to 8.8 ft-lb (12 N·m).
2. Position dash tray (6) in dash and secure with two barrel fasteners (7).
3. Install the instrument panel.
   3.1. Connect the electrical connector on the instrument panel to the harness connector.
   3.2. Position the instrument panel (3) on the dash assembly. Make sure tabs on upper edge properly engage with the corresponding slots on the dash assembly. Ensure that there are no wires exposed or pinched during positioning.
   3.3. Secure instrument panel to the dash assembly with screws (4 and 5). Tighten screws to 1.8 ft-lb (2.5 N·m).

FLOOR MAT AND RETAINERS

See General Warnings, Section 1, Page 1-1.

The floor mat retainers secure the floor mat to the vehicle and also provide a clean appearance to the side of the vehicle. Normally, if only the floor mat (3) needs to be removed, the screws (2) can be loosened slightly to allow the floor mat to be slid from beneath the retainers (1) **(Figure 4-4, Page 4-6)**.

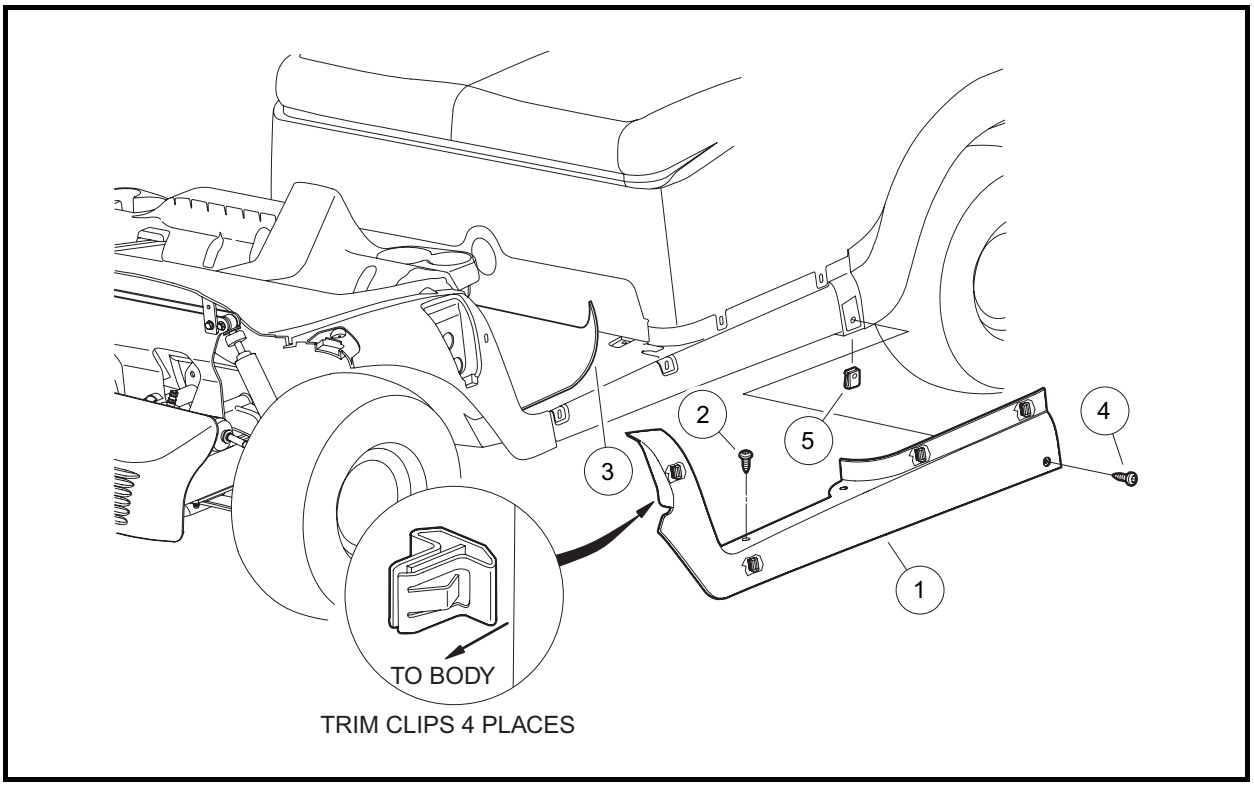

Figure 4-4 Floor Mat Retainer

FLOOR MAT RETAINER REMOVAL

1. Remove screws (2) from top of retainer (1) **(Figure 4-4, Page 4-6)**.
2. Remove screw (4) from lower rear corner of retainer. This screw threads into a J-clip (5) that is attached to the rear underbody.
3. Carefully pull on retainer to separate the trim clips from their respective slots. Trim clips do not normally need to be removed from the retainer.

FLOOR MAT RETAINER INSTALLATION

1. Position the retainer on the vehicle and press firmly to engage the trim clips to the vehicle **(Figure 4-4, Page 4-6)**.
2. Install one screw (4) at the lower rear of the retainer. Tighten screw to 1.8 ft-lb (2.5 N·m).
3. Ensure the floor mat is properly positioned beneath the top flange of the retainer and install two screws (2). Tighten screws to 4.4 ft-lb (6.0 N·m).

KICK PLATE AND CHARGER RECEPTACLE BEZEL

See General Warnings, Section 1, Page 1-1.

KICK PLATE AND CHARGER RECEPTACLE BEZEL REMOVAL

1. If charger bezel (4) requires removal, use charger bezel tool (CCI P/N 102562401) to remove bezel from the kick plate **(Figure 4-5, Page 4-8)**.
2. Remove floor mat. **See Floor Mat and Retainers, Section 4, Page 4-6.**
3. Remove three screws (1) that hold the kick plate (2) to the vehicle.
4. Remove the two front screws (3) that hold the beauty panel to the vehicle. Raise the forward portion of the rear beauty panel to disengage it from the tabs on the upper portion of the kick plate.
5. Remove kick plate from vehicle.

KICK PLATE AND CHARGER RECEPTACLE BEZEL INSTALLATION

1. Position the kick plate (2) on the vehicle and secure with three screws (1) **(Figure 4-5, Page 4-8)**. Ensure front lower edge of rear beauty panel mates with the kick plate. Tighten screws to 3.3 ft-lb (4.5 N·m).
2. Install two front screws (3) to secure the rear beauty panel. Tighten screws to 3.7 ft-lb (5 N·m).
3. Install floor mat. **See Floor Mat and Retainers, Section 4, Page 4-6.**
4. Snap charger bezel (4) in place on the kick plate.

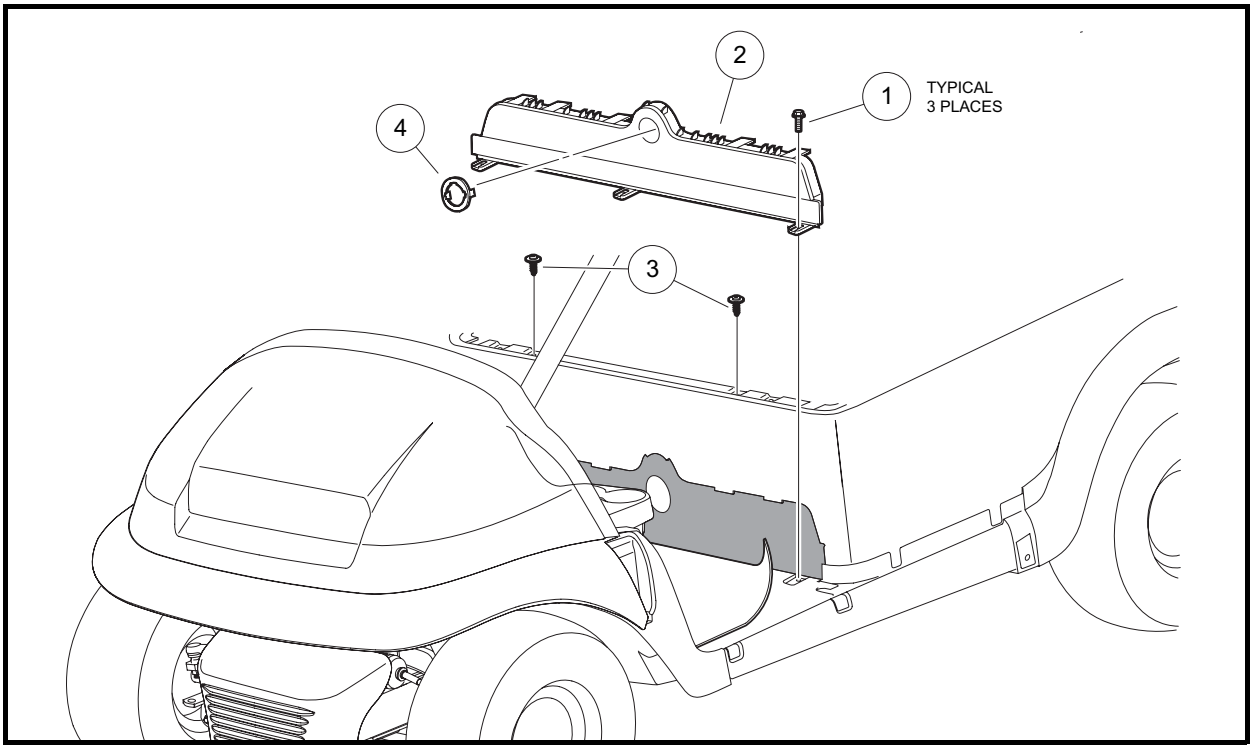

Figure 4-5 Kick Plate and Charger Receptacle Bezel

REAR BODY – TWO-PASSENGER VEHICLES

See General Warnings, Section 1, Page 1-1.

UNIVERSAL ACCESSORY MOUNTING

The Structural Accessory Module (SAM) includes two threaded inserts on both the driver side and the passenger side **(Figure 4-6, Page 4-8)**. These inserts serve as common attachment points for various accessories. Accessories that can be mounted to the SAM include single or dual sand bottles, sand bucket, and the club cleaner.

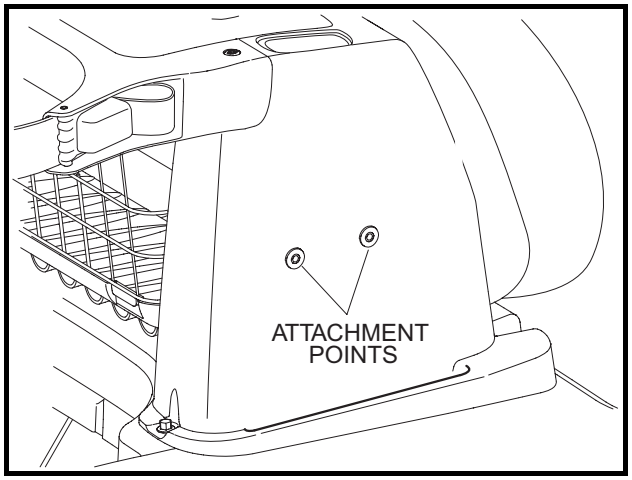

Figure 4-6 Universal Accessory Mounting

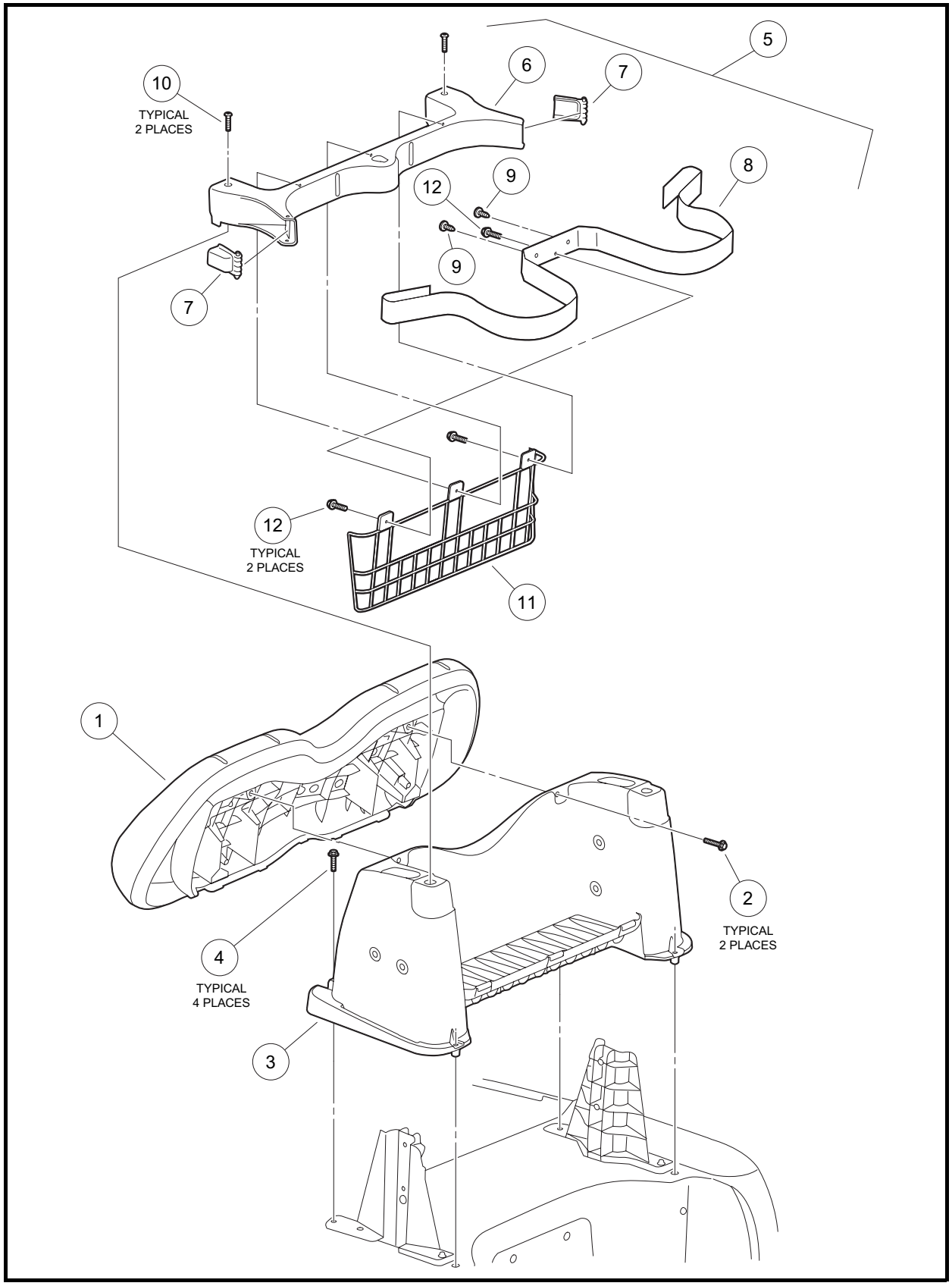

Figure 4-7 Backrest and SAM

BACKREST AND STRUCTURAL ACCESSORY MODULE (SAM)

SAM Removal

1. If the vehicle has a canopy, the rear upright supports must be removed from the SAM.
1. Remove four bolts (4) to release the SAM (3) from the vehicle **(Figure 4-7, Page 4-9)**

SAM Installation

1. Position the SAM (3) over its mounting holes and secure with four screws (4). Tighten screws to 53 in-lb (6 N·m) **(Figure 4-7, Page 4-9)**.

Backrest

The backrest (1) is secured to the SAM (3) with two screws (2) **(Figure 4-7, Page 4-9)**. When replacing the backrest, tighten screws (2) to 5.9 ft-lb (8 N·m).

Bag Rack Removal

1. Remove two screws (10) to release the bag hoop (6) and related components from the SAM (3) **(Figure 4-7, Page 4-9)**.
2. Bag strap (8) may be released by removing two plastic barrel connectors (9) and one screw (12).
3. Bag strap buckles (7) may be snapped out of bag hoop (6).

Bag Rack Installation

Installation is the reverse of removal. Tighten screw (12) to 4.8 ft-lb (6.5 N·m) and screws (10) to 11.8 ft-lb (16 N·m) **(Figure 4-7, Page 4-9)**.

Sweater Basket

The sweater basket (11) is secured to the bag hoop assembly by three screws (12). Tabs on the upper edge of the basket align with holes in the bag hoop (6) for installation purposes. Tighten screws (12) to 4.8 ft-lb (6.5 N·m) to secure the sweater basket **(Figure 4-7, Page 4-9)**.

REAR BODY COMPONENTS (TWO-PASSENGER)

Rear Beauty Panel Removal

1. Remove SAM. **See SAM Removal on page 4-10.**
2. Remove one screw (3) from each canopy support bracket (1 and 2) **(Figure 4-8, Page 4-11)**. Remove canopy supports.
3. Remove four screws (13) attaching the rear beauty panel (12) to the fuel bucket.
4. Remove two screws (14) and remove Forward/Reverse switch housing (15) from vehicle.
5. Disconnect electrical wires from the Forward/Reverse switch (16).
6. Lift rear beauty panel from vehicle.

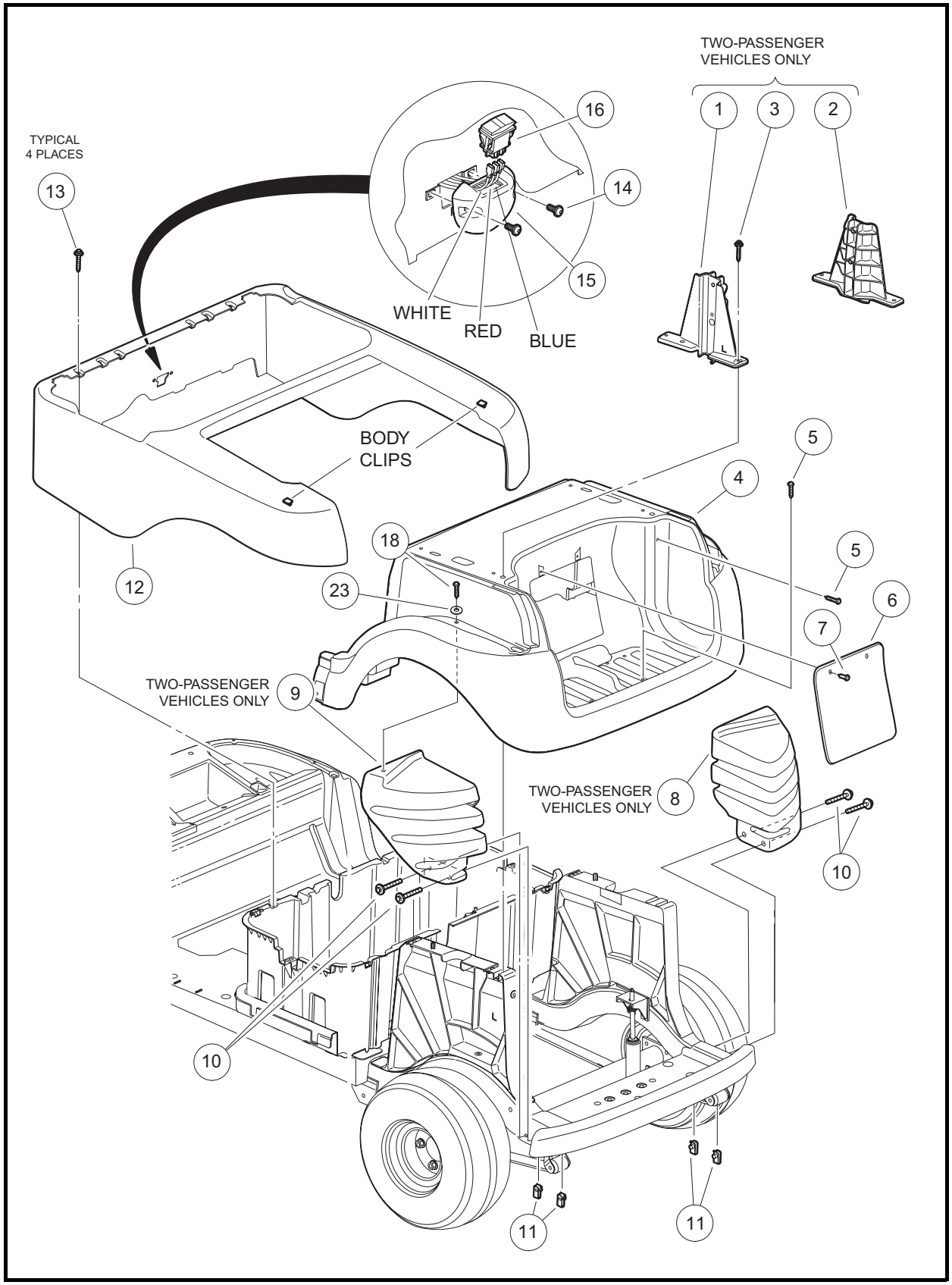

Figure 4-8 Rear Body Components

Rear Beauty Panel Installation

1. Install rear beauty panel (12) on vehicle. Make sure body clips on the rear of the beauty panel engage the mating slot in the rear underbody. Secure beauty panel in place with four screws (13). Tighten screws to 3.7 ft-lb (5 N·m) **(Figure 4-8, Page 4-11)**.
2. Connect the three wires to the Forward/Reverse switch (16) as shown.
3. Position the Forward/Reverse switch housing (15) on the front of beauty panel (12) and secure with two screws (14). Tighten screws to 20 in-lb (2.3 N·m).
4. Position canopy support brackets (1 and 2) on vehicle and secure each with one screw (3). Tighten screws to 53 in-lb (6 N·m).

Access Panel

Access panel (6) is secured to the rear underbody (4) with two expanding screws (7) **(Figure 4-8, Page 4-11)**. When replacing the panel, tighten screws (7) enough to hold the panel in place.

Rear Underbody Removal

1. Remove four screws (5) attaching the rear underbody (4) to vehicle **(Figure 4-8, Page 4-11)**.
2. Remove two screws (18) and washers (23) that attach the underbody to the two liners (8 and 9).
3. Lift the rear edge of the rear underbody (4) until the front portion slides out from beneath the front underbody. Remove the rear underbody from the vehicle.

Rear Underbody Installation

1. Install rear underbody (4) on the vehicle **(Figure 4-8, Page 4-11)**. Install two washers (23) and screws (18) to secure the underbody to the two wheel liners (8 and 9) and install four screws (5) to secure the underbody to the vehicle. Tighten screws (5 and 18) to 3.7 ft-lb (5 N·m).

Wheel Liner Removal

1. Remove bolts (10) to release liners (8 and 9) from vehicle **(Figure 4-8, Page 4-11)**.

Wheel Liner Installation

1. Position liners (8 and 9) on vehicle and secure with bolts (10). Bolts (10) thread into J-clips (11) attached to the inner-frame rail. Tighten bolts to 4.4 ft-lb (6 N·m).

REAR BODY – FOUR-PASSENGER VEHICLES

See General Warnings, Section 1, Page 1-1.

SEAT BACKS

Seat Back Removal

Remove screws (9 or 13) securing seat back (8 or 11) to seat support and remove the seat back **(Figure 4-11, Page 4-15)**.

Seat Back Installation

Secure seat back (8 or 11) to seat support with screws (9 or 13). Tighten screws to 71 in-lb (8 N·m) **(Figure 4-11, Page 4-15)**.

SEAT SUPPORT

Seat Support Removal

1. Remove screws (8 and 11) securing the rear hip restraints (6) and remove the hip restraints from the vehicle **(Figure 4-9, Page 4-13)**.
2. Remove the screws (5) and bolts (4) from the seat support (3) and remove the seat support from the vehicle.

Seat Support Installation

1. Install in the reverse order of removal.
2. Tighten bolts (4) to 53 in-lb (6 N·m). Tighten screws (5) to 44 in-lb (5 N·m). Tighten bolts (8 and 11) to 124 in-lb (14 N·m) **(Figure 4-9, Page 4-13)**.

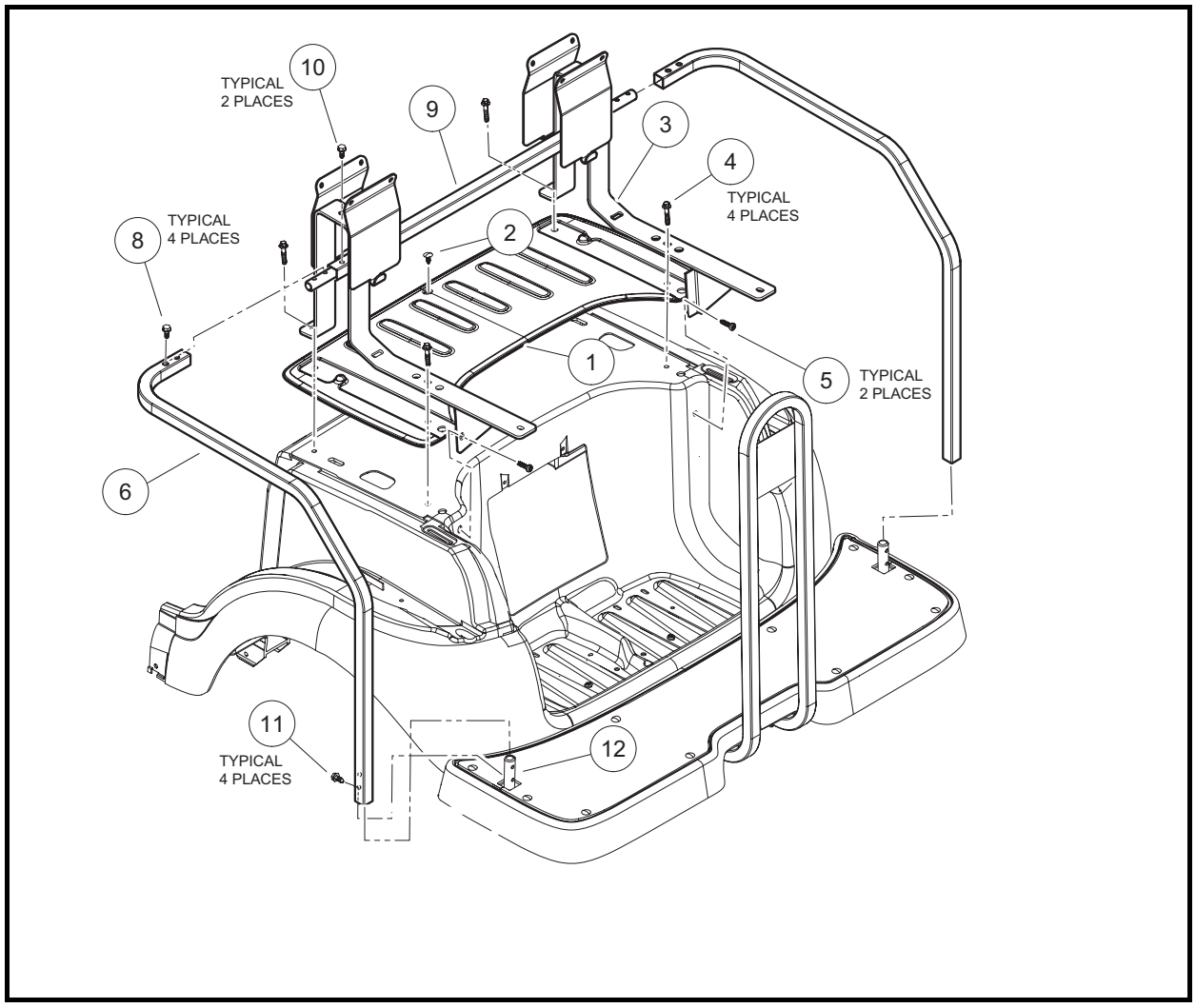

Figure 4-9 Seat Supports (Four-Passenger Vehicles)

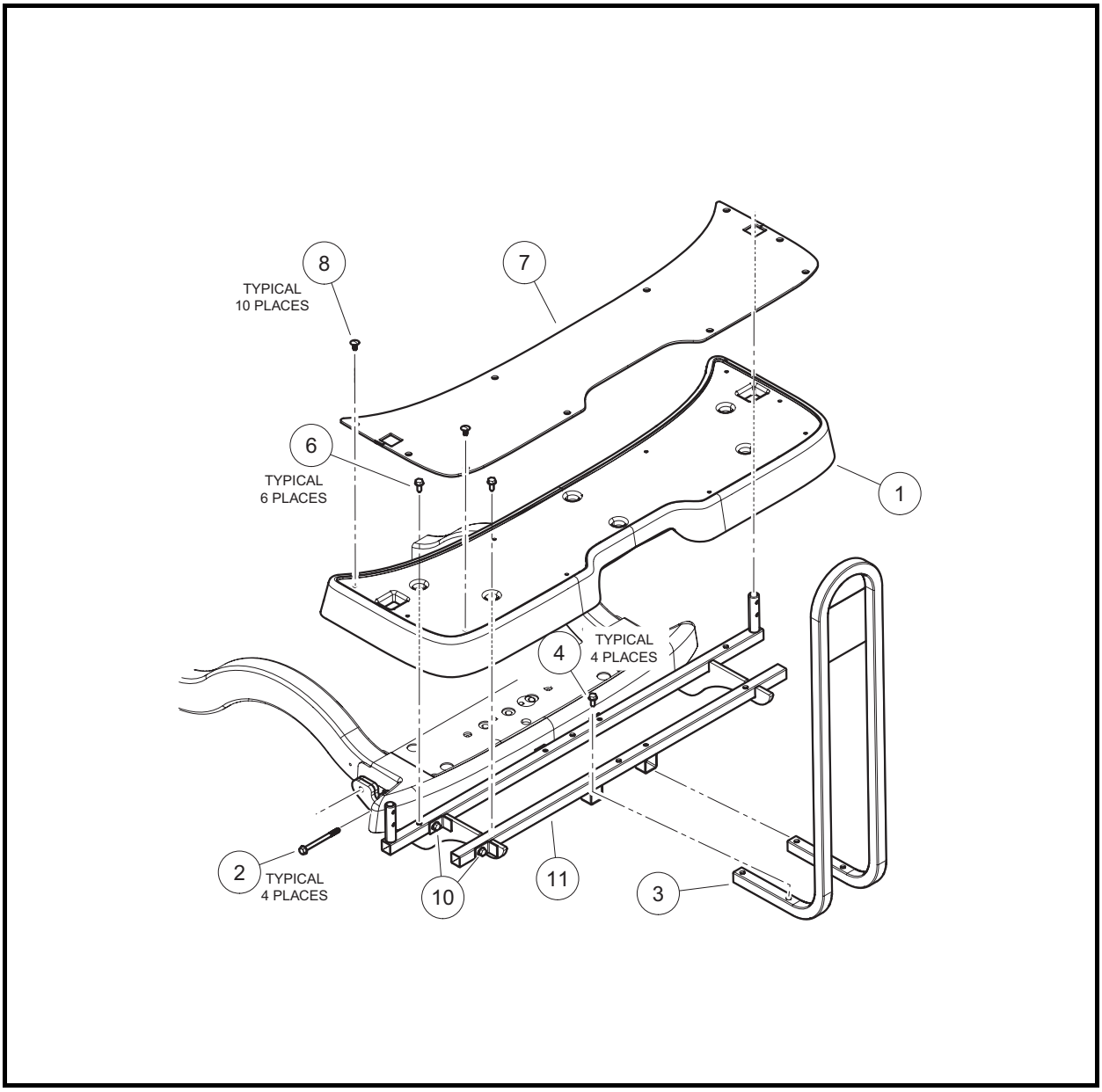

Figure 4-10 Foot Deck (Four-Passenger Vehicles)

FOOT DECK

Foot Deck Removal

3. Remove screws (8 and 11) securing the rear hip restraints (6) and remove the hip restraints from the vehicle **(Figure 4-9, Page 4-13)**.
4. Remove the four bolts (2) securing the foot deck (1) to the vehicle frame **(Figure 4-10, Page 4-14)**.

Foot Deck Installation

1. Install foot rest in reverse order of removal.
2. Tighten bolts (2) to 71 in-lb (8 N·m) **(Figure 4-10, Page 4-14)**

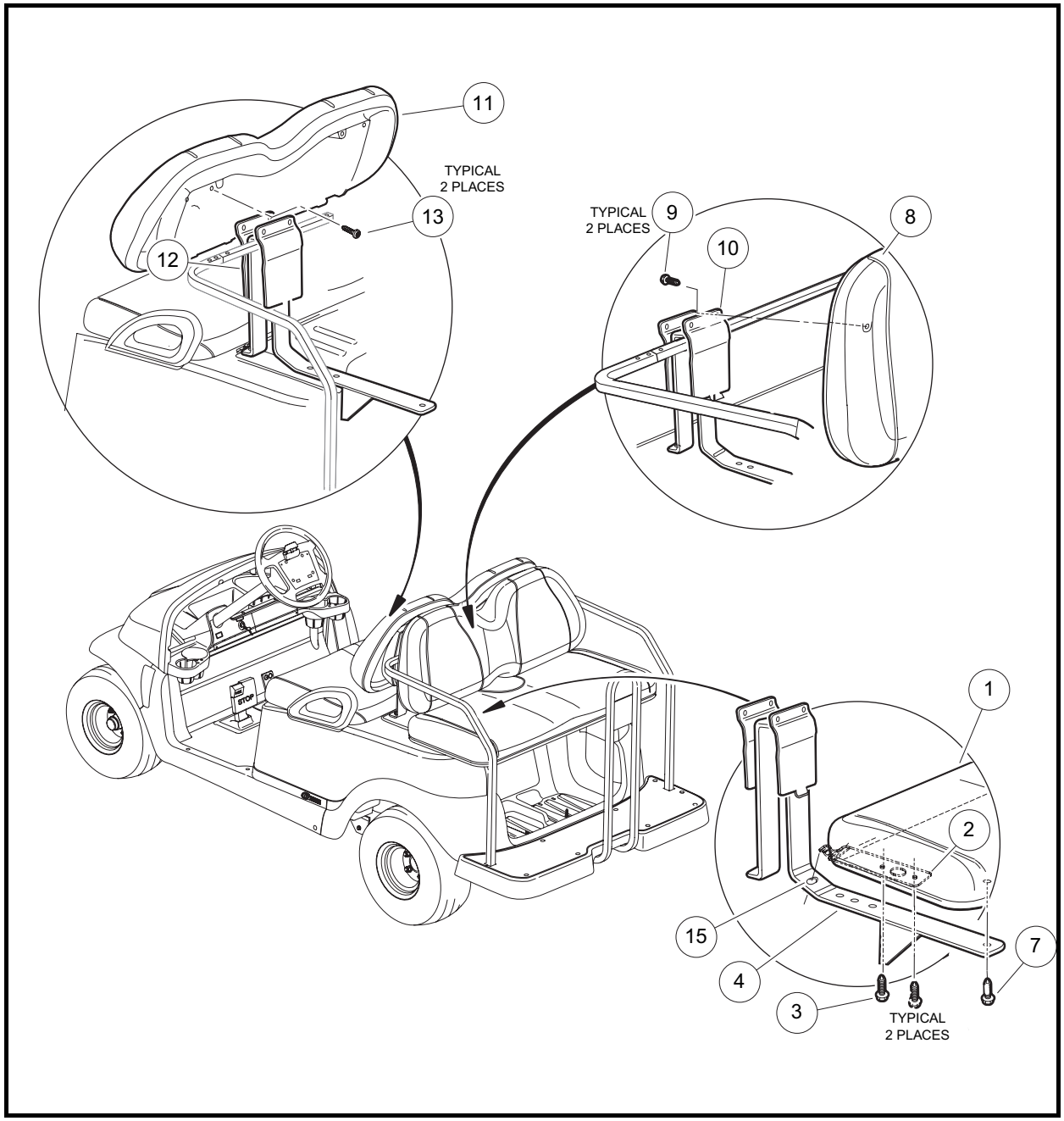

Figure 4-11 Seats (Four-Passenger Vehicles)

REAR BODY COMPONENTS (FOUR-PASSENGER)

Rear Beauty Panel Removal

1. Remove seat support. **See Seat Support Removal on page 4-13.**
2. Remove four screws (13) attaching the rear beauty panel (12) to the fuel bucket **(Figure 4-8, Page 4-11)**.
3. Remove two screws (14) and remove the Forward/Reverse switch housing (15) from vehicle.
4. Disconnect electrical wires from the Forward/Reverse switch (16).
5. Lift rear beauty panel from vehicle.

Rear Beauty Panel Installation

1. Install rear beauty panel (12) on vehicle. Make sure body clips on the rear of the beauty panel engage the mating slot in the rear underbody. Secure beauty panel in place with four screws (13). Tighten screws to 3.7 ft-lb (5 N·m) **(Figure 4-8, Page 4-11)**.
2. Connect the three wires to the Forward/Reverse switch (16) as shown.
3. Position the Forward/Reverse switch housing (15) on the front of beauty panel (12) and secure with two screws (14). Tighten screws to 20 in-lb (2.3 N·m).
4. Install seat support. **See Seat Support Installation on page 4-13.**

Access Panel

Access panel (6) is secured to the rear underbody (4) with two expanding screws (7) **(Figure 4-8, Page 4-11)**. When replacing the panel, tighten screws (7) enough to hold the panel in place.

Rear Underbody Removal

1. Remove four screws (5) attaching the rear underbody (4) to vehicle **(Figure 4-8, Page 4-11)**.
2. Lift the rear edge of the rear underbody (4) until the front portion slides out from beneath the front underbody. Remove the rear underbody from the vehicle.

Rear Underbody Installation

1. Install rear underbody (4) on the vehicle **(Figure 4-8, Page 4-11)**. Install four screws (5) to secure the underbody to its vehicle. Tighten screws (5 and 18) to 3.7 ft-lb (5 N·m).

CANOPY – TWO-PASSENGER

See General Warnings, Section 1, Page 1-1.

CAUTION

- **To prevent damage to the canopy, do not remove the canopy supports (3, 7, and 10) from the vehicle without first removing the canopy (1) (Figure 4-12, Page 4-17).**

TWO-PASSENGER CANOPY REMOVAL

1. Remove the two nuts (9) and two bolts (8) from the canopy (1) and each front canopy support (7 and 10) **(Figure 4-12, Page 4-17)**.
2. Remove the nuts (5) and bolts (4) from the canopy (1) and each rear support (3).
3. Lift canopy (1) away from front canopy supports (7 and 10) and rear supports (3).
4. Remove screws (14) securing front canopy support covers to front body.
5. Slide canopy support covers (12 and 13) up front canopy supports (7 and 10) to gain access to bolts (11).
6. Remove two bolts (11) from each front canopy support (7 and 10) and remove canopy supports from the vehicle.
7. Remove two bolts (6) from each rear support (3) and pull rear supports from vehicle.

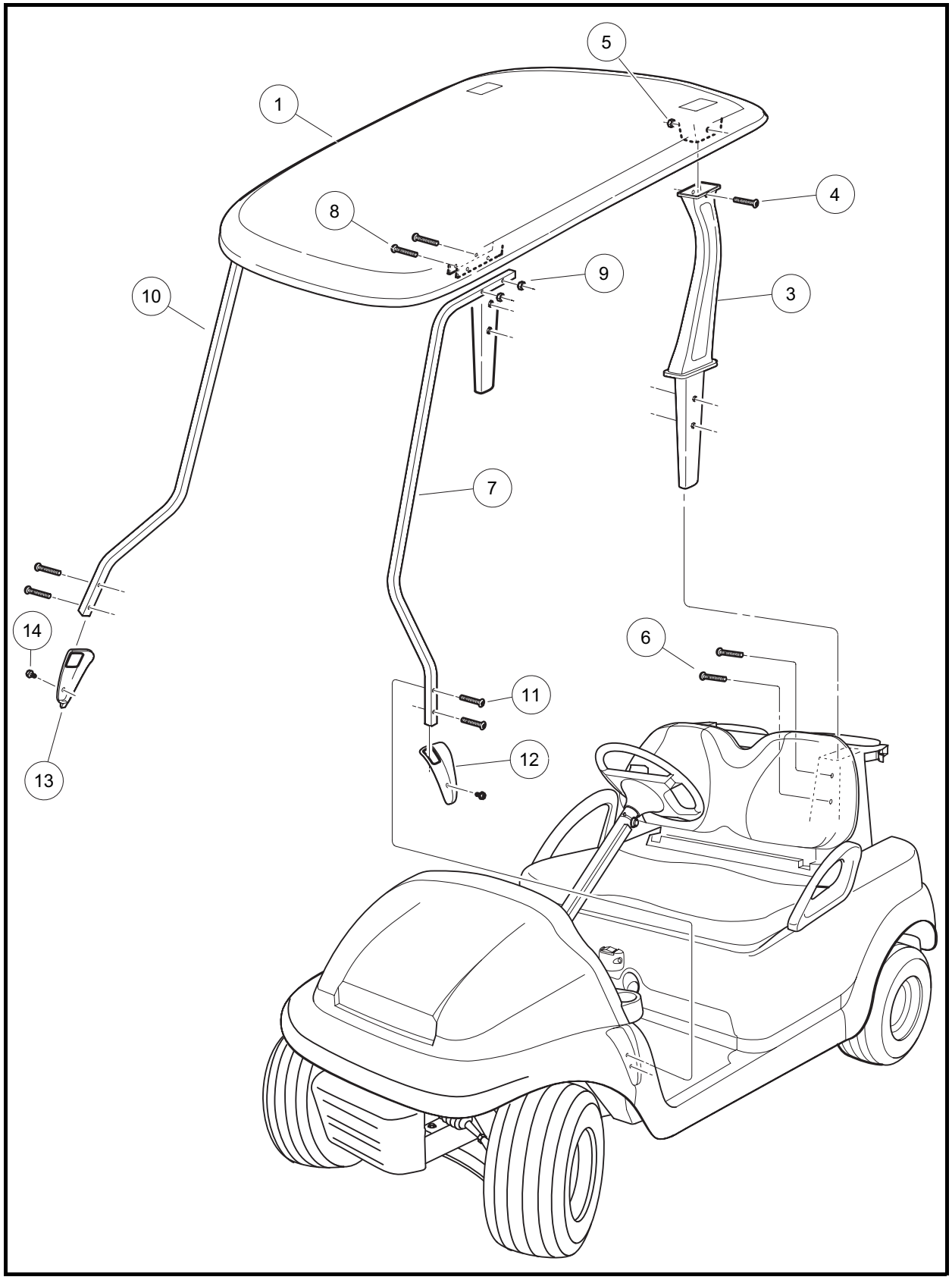

Figure 4-12 Precedent Two-Passenger Canopy

TWO-PASSENGER CANOPY INSTALLATION

1. Install the front canopy supports.

   1.1. Ensure the front supports are properly oriented to the correct side of the vehicle as shown **(Figure 4-12, Page 4-17)**. The lower profile of each support follows the profile of the vehicle. If the supports are placed on the wrong side of the vehicle, they will not follow the vehicle's profile.

   1.2. Align the holes in the lower portion of each front support (7 and 10) with the corresponding holes in the vehicle. Insert two bolts (11) through each front support into the threaded holes in the vehicle. The bolts are color-coded with gold thread lock. Only finger-tighten the bolts at this time.

   1.3. Slide the covers (12 and 13) over the front supports. The covers are marked DRIVER and PASS to identify them as going on the driver side or passenger side respectively. Do not install the screws (14) yet.

2. Insert the two rear canopy supports (3) into the openings on the top of the Structural Accessory Module (SAM).

3. From the inside of the basket, insert two bolts (6) through the basket wall and into each support. The bolts are color-coded with blue thread-lock. Finger-tighten the bolts to avoid cross-threading the threads in the supports. **See following CAUTION.**

CAUTION

- **Using tools to thread the bolts could prevent proper feel of the bolt as it captures the female threads in the support. This could result in damage to the components.**

4. Position the canopy on top of the front and rear supports. Ensure that the front supports are properly positioned between the molded tabs on the underside of the canopy and that the molded protrusions at the rear of the canopy extend into the top of the rear supports.

5. Secure the canopy to the front supports with four bolts (8) and lock nuts (9). Use two bolts on each support, inserting the bolts from the inside. Tighten the lock nuts to 50 in-lb (5.6 N·m).

6. Secure the canopy to the rear supports with two bolts (4) and locknuts (5).Tighten the lock nuts to 50 in-lb (5.6 N·m).

7. At the rear supports (3), tighten the four bolts (6) to 31 in-lb (3.5 N·m).

8. At the front supports (7 and 10), tighten the four bolts (11) to 18.4 ft-lb (25 N·m).

9. Position each cover (12 and 13) over its respective support. A hole in each cover should be aligned with a corresponding hole in the support. Secure the cover to the support with a screw (14). Tighten the screws (14) to 31 in-lb (4.6 N·m).

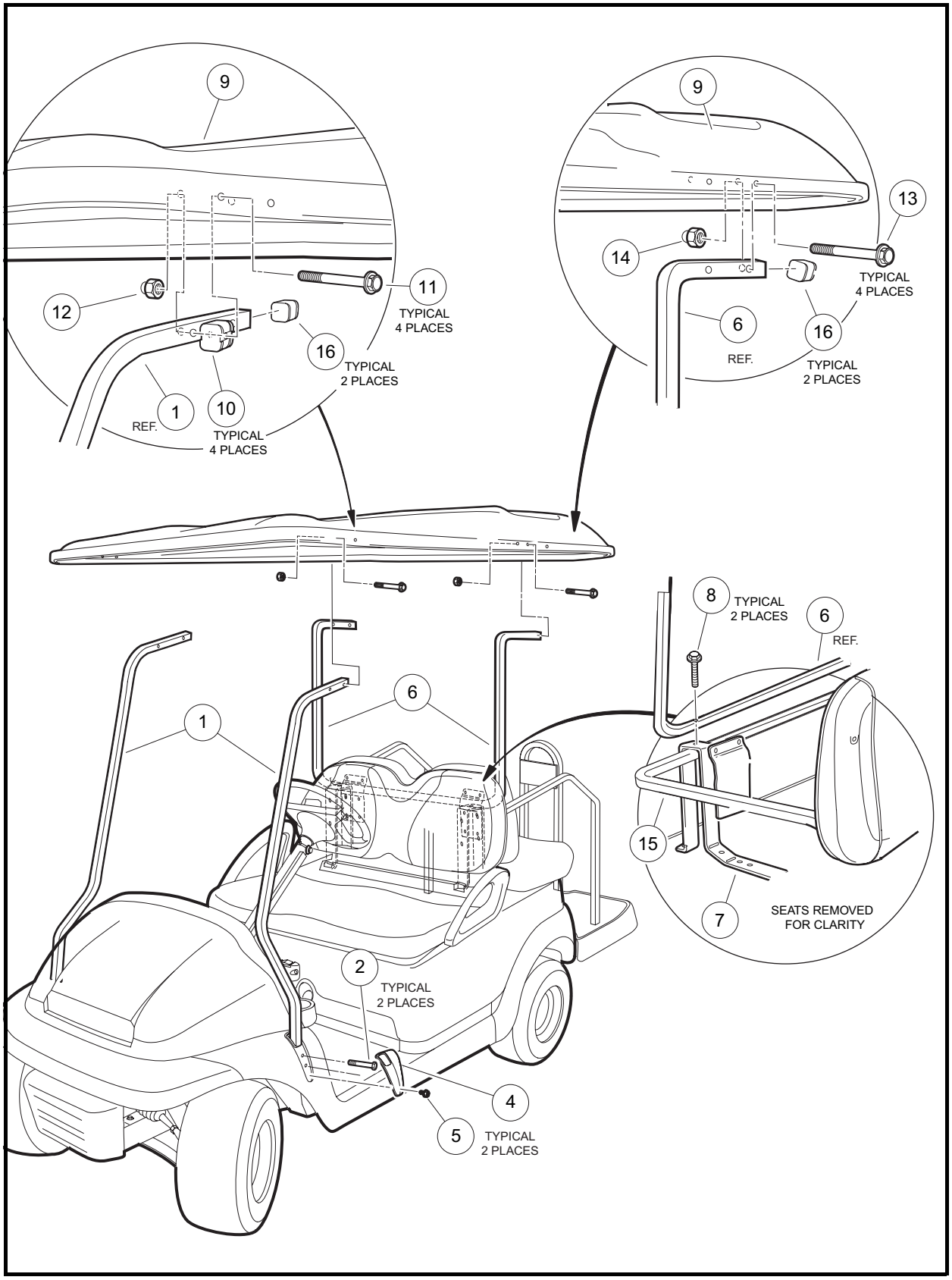

Figure 4-13 Precedent Four-Passenger Canopy

CANOPY – FOUR-PASSENGER

See General Warnings, Section 1, Page 1-1.

CAUTION

- **To prevent damage to the canopy, do not remove the canopy supports (1 and 6) from the vehicle without first removing the canopy (9) (Figure 4-13, Page 4-19).**

FOUR-PASSENGER CANOPY REMOVAL

1. Remove the two nuts (12), two bolts (11), and spacers (10) from the canopy (9), and each front canopy support (1) **(Figure 4-13, Page 4-19)**.
2. Remove the nuts (14) and bolts (13) from the canopy (9) and the rear support (6).
3. Lift canopy (9) away from front canopy supports (1) and rear support (6).
4. Remove screws (5) securing front canopy support covers to front body.
5. Slide canopy support covers (4) up front canopy supports (1) to gain access to bolts (2).
6. Remove two bolts (2) from each front canopy support (1) and remove the canopy supports from the vehicle.
7. Remove two bolts (8) from the rear support (3) and remove rear support from vehicle.

FOUR-PASSENGER CANOPY INSTALLATION

1. Install the front canopy supports.
   1.1. Ensure the front supports are properly oriented to the correct side of the vehicle as shown **(Figure 4-13, Page 4-19)**. The lower profile of each support follows the profile of the vehicle. If the supports are placed on the wrong side of the vehicle, they will not follow the vehicle's profile.
   1.2. Align the holes in the lower portion of each front support (1) with the corresponding holes in the vehicle. Insert two bolts (2) through each front support into the threaded holes in the vehicle. The bolts are color-coded with gold thread lock. Only finger-tighten the bolts at this time.
   1.3. Slide the front support covers (4) over the front supports (1). The covers are marked DRIVER and PASS to identify them as going on the driver side or passenger side respectively. Do not install the screws (5) yet.
2. Remove the two bolts that secure the hip restraint (15) to the seat supports (7).
3. Align the rear canopy support (6) with the top of the seat supports (7) and secure with two bolts (8) as shown. Tighten the hardware to 124 in-lb (14 N·m).
4. Secure the front of the canopy (9) to the front supports (1) with four spacers (10), bolts (11), and cap-nuts (12). Tighten the hardware to 10 ft-lb (13.6 N·m).
5. Secure the rear of the canopy (9) to the rear canopy support (6) with four bolts (13) and cap-nuts (14). Tighten the hardware to 10 ft-lb (13.6 N·m).
6. Tighten the four bolts (2) installed in step 1.2 to 18 ft-lb (25 N·m).
7. Secure each front support cover (4) with one screw (5). Tighten the hardware to 53 in-lb (6 N·m).

SECTION 5 – ACCELERATOR AND BRAKE PEDAL GROUP

⚠ DANGER

- **See General Warnings, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warnings, Section 1, Page 1-1.**

PEDAL GROUP

See General Warnings, Section 1, Page 1-1.

PEDAL GROUP REMOVAL

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warnings, Section 1, Page 1-2.**
2. Remove screws (1). Pull floor mat retainer (3) away from the vehicle **(Figure 5-1, Page 5-1)**.
3. Pull floor mat (2) over the pedal group to gain access to the pedal group hardware.
4. Lift off cover plate (7) **(Figure 5-2, Page 5-2)**.
5. Loosen jam nuts (4 and 5) on each side of turnbuckle (6).
6. Nut (4) has a left-hand thread.

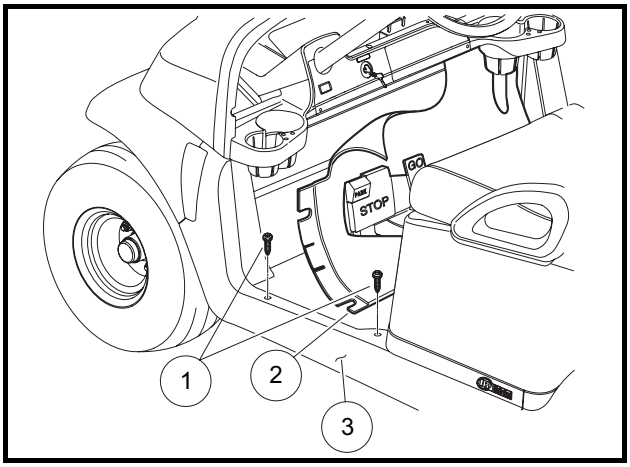

Figure 5-1 Pedal Group Access

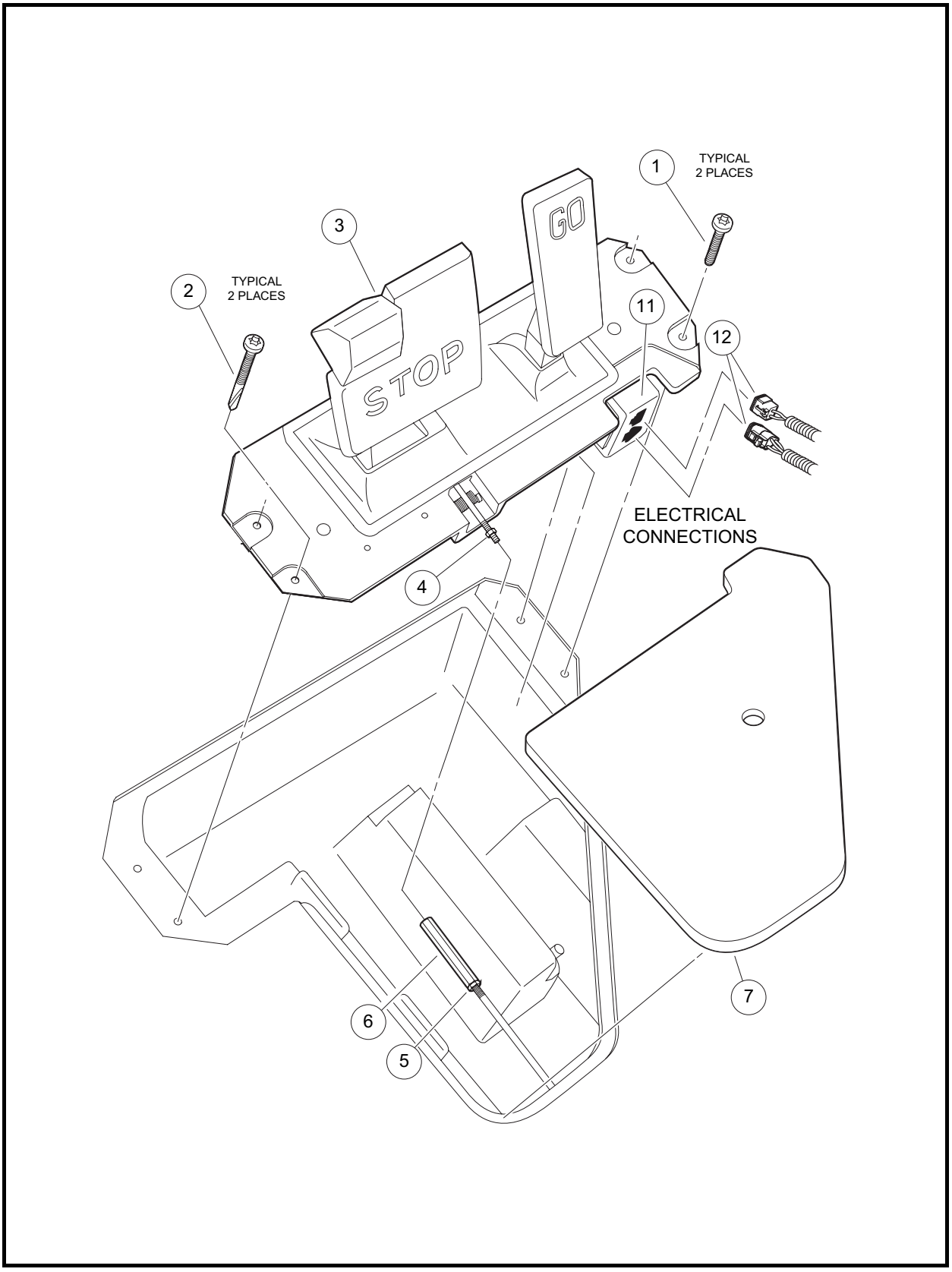

Figure 5-2 Pedal Group

Pedal Group Removal, Continued:

7. Loosen turnbuckle (6) until the threaded rod from the pedal group is free of the turnbuckle.
8. Remove two screws (2) on the driver side of the pedal group and two screws (1) on the passenger side of the pedal group.
9. Slightly lift pedal group from the vehicle to gain access to the connections to the MCOR on the passenger side of the pedal group.
10. Disconnect the electrical connectors at the MCOR.
11. Remove two screws (1) to separate the MCOR from the pedal group **(Figure 5-3, Page 5-3)**.

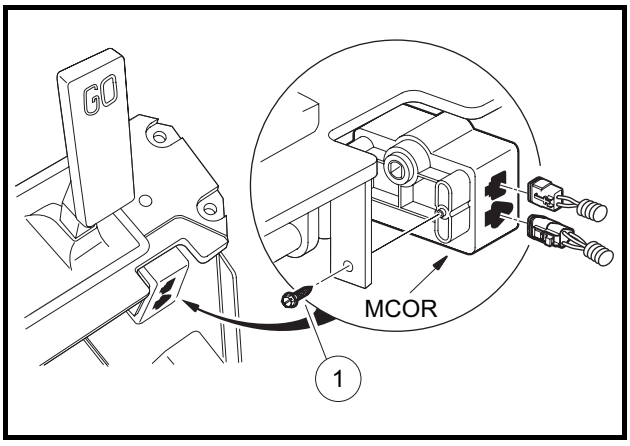

Figure 5-3 MCOR Removal

MCOR

The pedal group for the Precedent electric vehicle includes a Motor Controller Output Regulator (MCOR) mounted on the side of the pedal group. The MCOR detects the position of the GO pedal and sends a corresponding voltage to the motor controller.

DEBRIS SHIELDS

Debris shields on the top face of the pedal group prevent excessive debris from contacting the moving parts of the pedal group. Both shields (3 and 4) are held in place with screws (1) and washers (2) **(Figure 5-4, Page 5-5)**. When shields are replaced, tighten screws (1) to 53 in-lb (6 N·m).

BRAKE RETURN SPRING

⚠ CAUTION

- **Spring is under tension. Use caution when working with springs.**

The brake return spring (5) provides the pressure needed to return the brake pedal to its upright position **(Figure 5-4, Page 5-5)**. One end of the spring attaches to a hook on pedal (11) and the other end attaches to pedal base (12).

PAWL ASSEMBLY

The pawl assembly (6) serves to lock the brakes when the PARK pedal is pressed. The pawl assembly also releases the brakes when either the STOP or GO pedal is pressed **(Figure 5-4, Page 5-5)**. The pawl assembly is serviced as a unit. The replacement unit includes two snap rings (7), pin (8), spring (9), and pawl unit (6). When replacing the unit, ensure spring (9) is properly positioned to be held in place when the pin (8) is installed. Secure the pin with two snap rings (7).

ACCELERATOR RETURN SPRING

The accelerator return spring assembly (10) consists of two springs and three T-shaped bars secured by two crosspins **(Figure 5-4, Page 5-5)**. The assembly is replaced as a unit. The replacement unit includes a pin that keeps the spring compressed so it can be installed in the pedal group. Replace the assembly as follows:

⚠ CAUTION

- **Spring is under tension. Use caution when working with springs.**

1. With the pedal group removed from the vehicle and debris shield removed, remove the accelerator return spring assembly.
2. To install accelerator return spring assembly, position the accelerator return spring unit in the pedal group with the lower crosspin of the assembly positioned in the pedal group, and secure it in place with the clip (1) **(Figure 5-5, Page 5-6)**.
3. Position upper crosspin in the tab on the pedal group **(Figure 5-6, Page 5-6)**.
4. Push accelerator pedal forward to compress the springs in the assembly. While the springs are compressed, pull pin from both T-shaped bars then release the pedal **(Figure 5-7, Page 5-6)**.

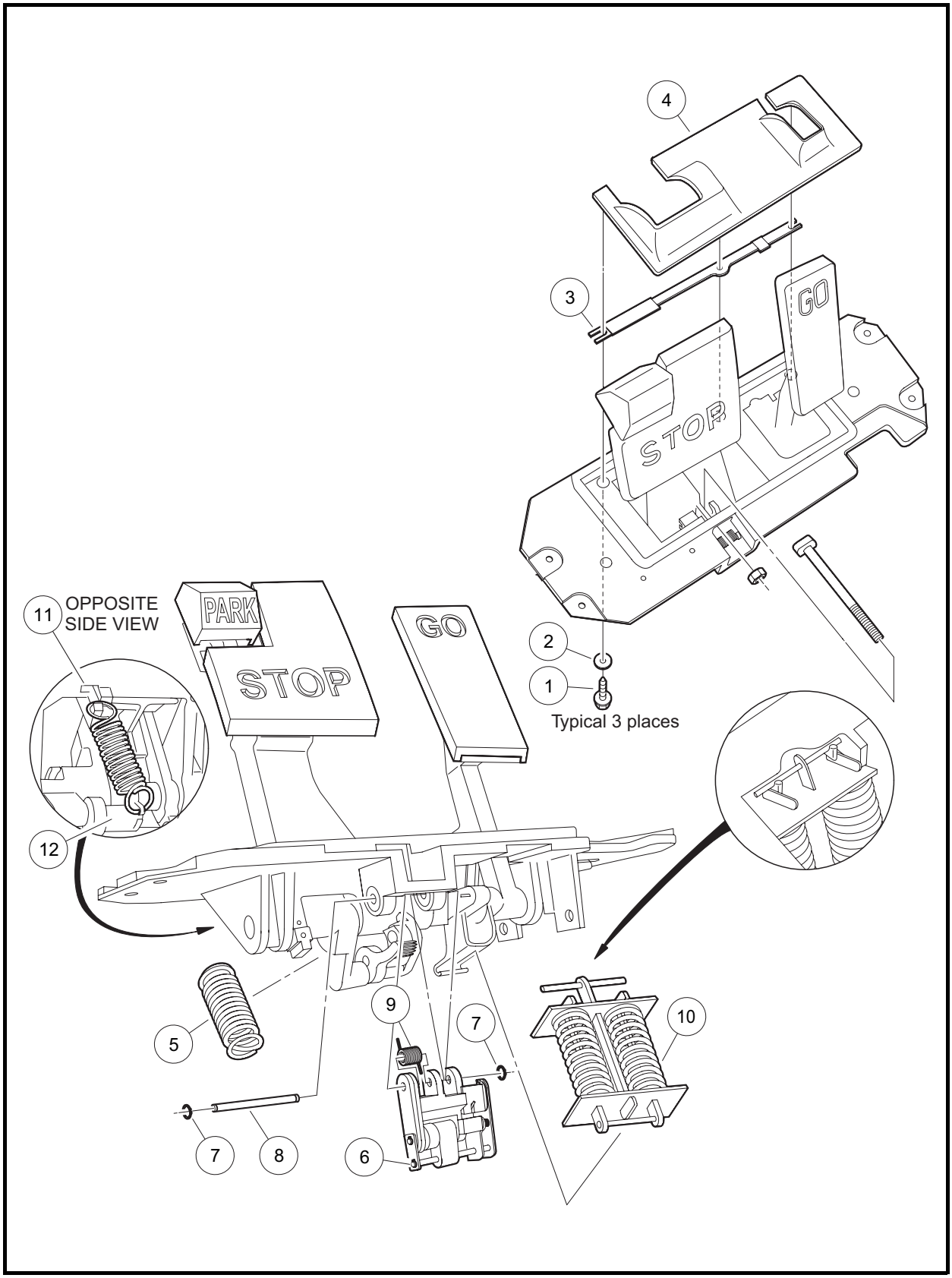

Figure 5-4 Brake Pedal

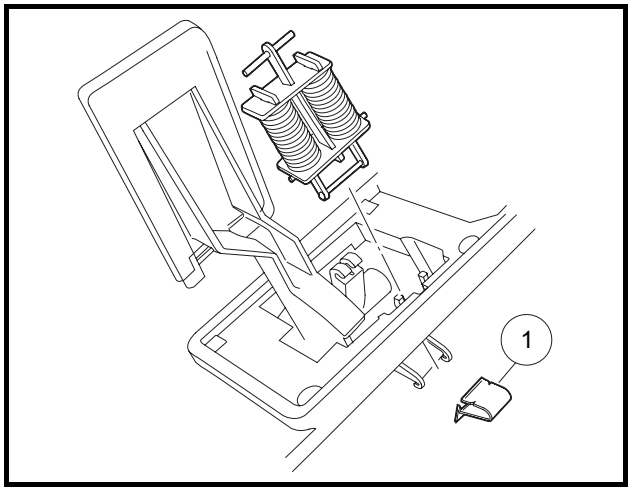

Figure 5-5 Accelerator Spring Clip

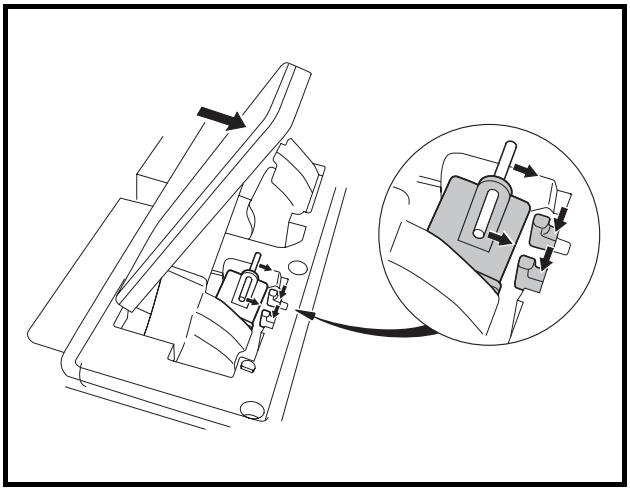

Figure 5-6 Accelerator Spring Upper Crosspin

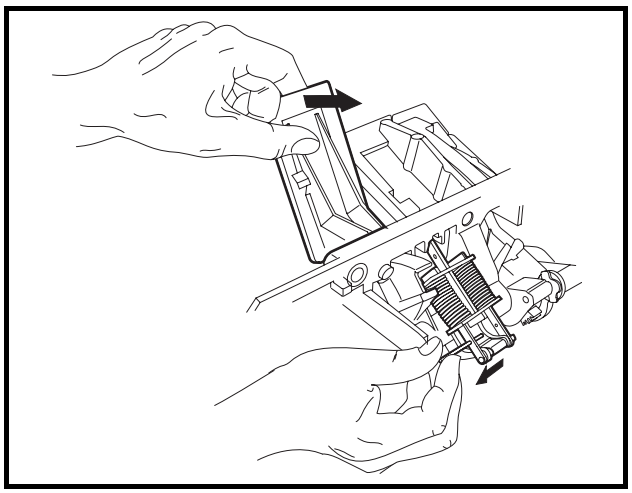

Figure 5-7 Accelerator Spring Pin Removal

PEDAL GROUP INSTALLATION

1. Place the MCOR on the pedal group and secure with two screws (1) **(Figure 5-3, Page 5-3)**. Tighten screws to 23 in-lb (2.6 N·m).
2. Connect the wire harness (12) to the MCOR (11) **(Figure 5-2, Page 5-2)**.

NOTE: *Connectors will only fit together in one orientation.*

3. Position the pedal group in vehicle and secure with two screws (2) on the driver side and two screws (1) on the passenger side. Tighten driver side screws (2) to 12 ft-lb (16.3 N·m). Tighten passenger side screws (1) to 5 ft-lb (6.8 N·m).
4. Use the turnbuckle (6) to connect the rod from the pedal group to the brake actuator rod. Ensure the ends of the brake cables do not slip out of the brake equalizer during this procedure.
5. Adjust the brake cable equalizer tension. **See Brake Cable Equalizer Adjustment, Section 6, Page 6-9.**
6. Place floor cover plate (7) over the floor opening **(Figure 5-2, Page 5-2)**.
7. Install the floor mat (2) over the pedal group. Make sure tabs on floor mat sides are beneath the sill (3). Tighten screws (1) to 53 in-lb (6 N·m) **(Figure 5-1, Page 5-1)**.

SECTION 6 – WHEEL BRAKE ASSEMBLIES

⚠ DANGER

- **See General Warnings, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warnings, Section 1, Page 1-1.**
- **Some aftermarket brake shoes contain asbestos fiber, and asbestos dust is created when these brake mechanisms are handled. Wear approved eye and respiratory protection when disassembling and cleaning brake mechanisms. Inhalation of asbestos could result in severe personal injury or death. Do not use compressed air or aerosol sprays to clean the brake mechanism. Clean brake mechanism using the negative pressure enclosure/hepa vacuum system or low pressure/wet cleaning method per OSHA/29 CFR - 1910.1001.**

GENERAL INFORMATION

Precedent Golf Cars are equipped with self-adjusting, mechanically-expanding shoe drum brakes on each rear wheel.

BRAKE SHOE REMOVAL

See General Warnings, Section 1, Page 1-1. See also Warning on Page 6-1.

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warnings, Section 1, Page 1-2.**
2. Place chocks at the front wheels. Loosen, but do not remove, lug nuts on rear wheels and lift the rear of the vehicle with a chain hoist or floor jack. Place jack stands under the axle tubes to support the vehicle. **See WARNING "Lift only one end..." in General Warnings, Section 1, Page 1-2.**
3. Gain access to the pedal group by removing the floor mat and access panel. **See Pedal Group Removal, Section 5, Page 5-1.**
4. Loosen the two jam nuts (1 and 3) on either side of turnbuckle (2) **(Figure 6-1, Page 6-2)**. Note that the forward jam nut (1) is a left-hand thread. Thread each nut approximately 1/2 inch (12.7 mm) away from the turnbuckle.
5. Loosen turnbuckle (2) to release tension on the equalizer bracket (4) that pulls on the heads of the brake cables.
6. Remove the rear wheels and then the brake drums. If the brake drums were easily removed, proceed to step 8.

⚠ CAUTION

- **Worn or damaged brake drums cannot be machined to refinish them. Replace as necessary.**

NOTE: *When servicing vehicles with severely worn brake shoes and when the drums cannot be removed by normal methods, proceed to step 7 to minimize damage to the brake cluster and brake components.*

Brake Shoe Removal, Continued:

7. Remove brake drums and badly worn brake shoes.
   7.1. On the back of each brake cluster assembly, locate the heads of two brake shoe retainer pins. It may be necessary to remove sealant material around the head of each pin.

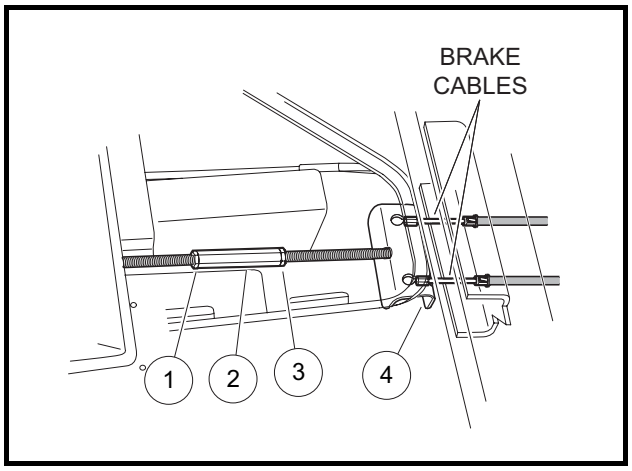

Figure 6-1 Loosen Turnbuckle

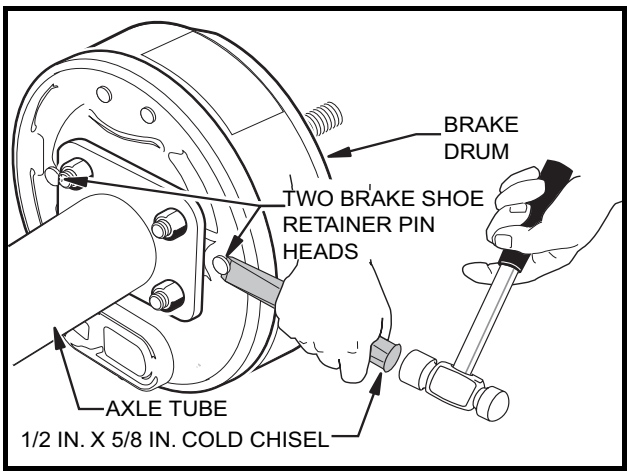

Figure 6-2 Shoe Retainer Pins

   7.2. Insert a 1/2 inch x 5/8 inch cold chisel under the head of each pin and shear them off as illustrated **(Figure 6-2, Page 6-2)**. This will release the shoes from the backing plate, allowing them to pivot away from the inside of the brake drum, which should then allow the brake drum to be pulled free. After completing step 8, skip step 9.

NOTE: *Although step 8 allows easier access to the brake shoes, it is not imperative to do so in order to remove the brake shoes.*

8. Remove the axle.
   8.1. Using 90° snap ring pliers (CCI P/N 1012560), remove the axle retaining ring (1) **(Figure 6-3, Page 6-2)**.
   8.2. Pull the axle shaft (2) from the axle tube **(Figure 6-3, Page 6-2)**.

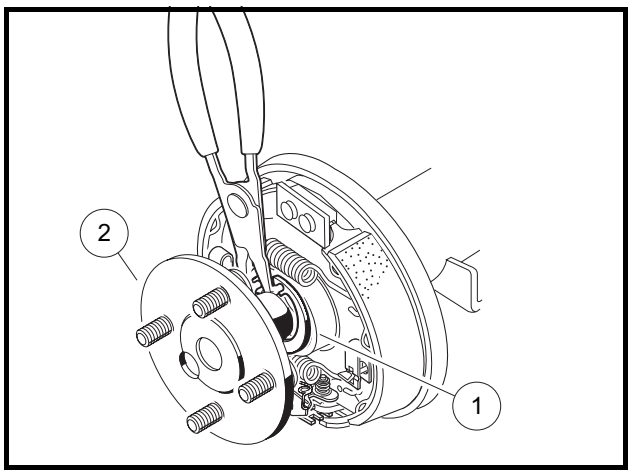

Figure 6-3 Remove Axle Retaining Ring

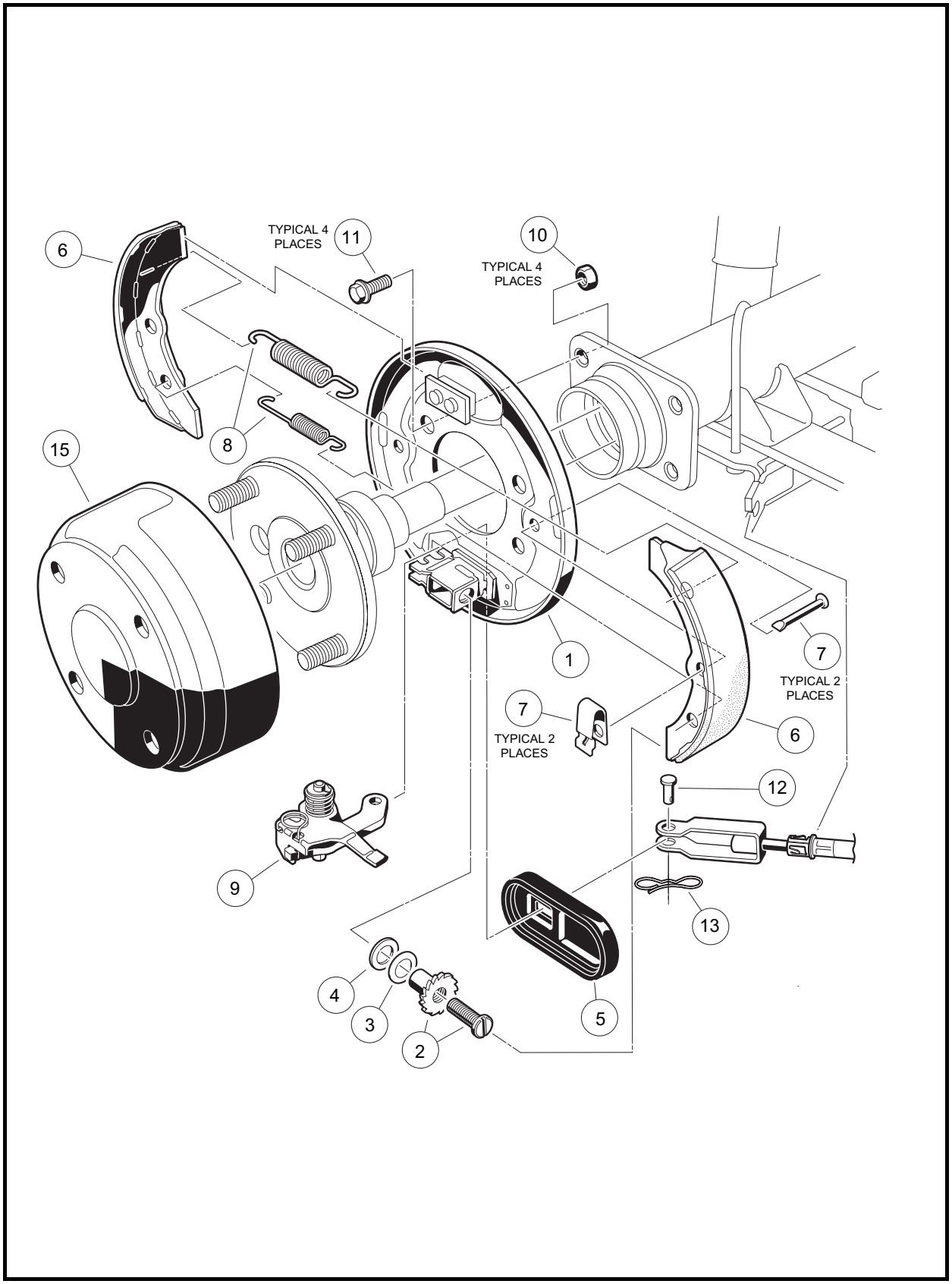

Figure 6-4 Self-adjusting Wheel Brake Assembly

Brake Shoe Removal, Continued:

9. Using needle nose pliers, turn the clip retainer pin (1) 90° to remove the shoe retainer clip (2) **(Figure 6-5, Page 6-4)**.

⚠ CAUTION

- **The brake shoes are under pressure and can release suddenly when brake shoe retainers are removed.**

10. Grasp both brake shoes and pull them, together with the springs, out of the brake assembly as shown **(Figure 6-6, Page 6-4)**.

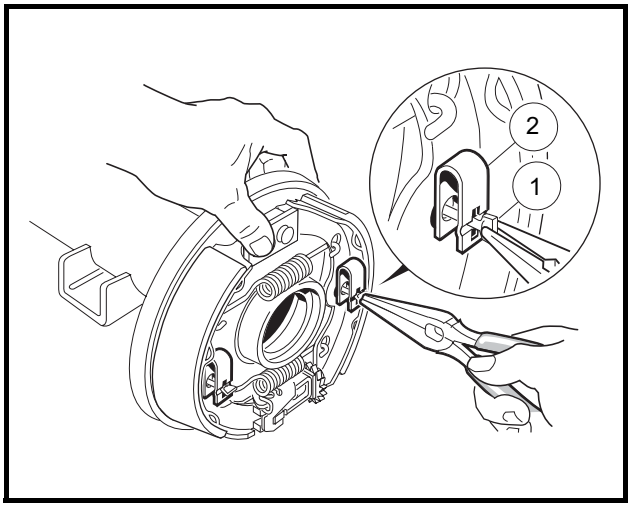

Figure 6-5 Remove Shoe Retainer Clip

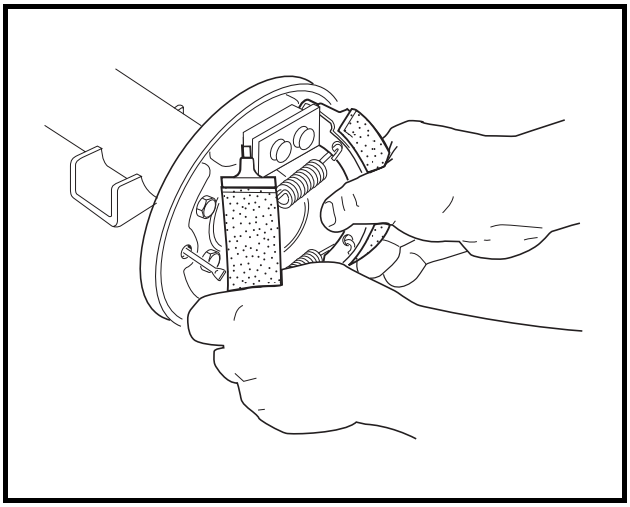

Figure 6-6 Remove Brake Shoes

11. Remove adjuster wheel (1) with two washers (2 and 3) from the backing plate **(Figure 6-7, Page 6-4)**.

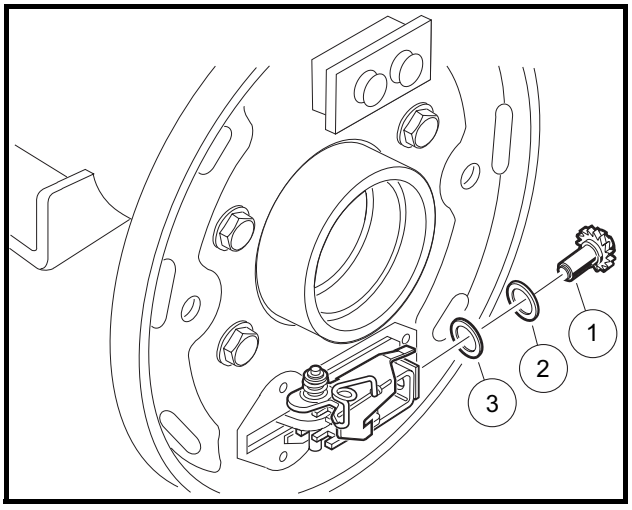

Figure 6-7 Remove Adjuster Wheel

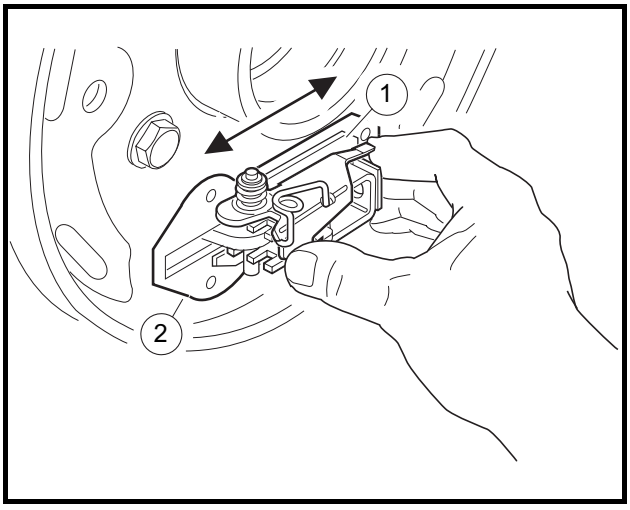

Figure 6-8 Lubricate Slide and Slide Plate

BRAKE ASSEMBLY CLEANING

See General Warnings, Section 1, Page 1-1. See also Warning on Page 6-1.

1. Carefully clean the brake backing plate and all of its mechanical components.
2. Remove the rubber boot from backing plate and wipe with a clean damp cloth.
3. Lubricate the slide (1) and slide plate (2) with dry moly lubricant (CCI P/N 1012151) on both sides of the backing plate **(Figure 6-8, Page 6-4)**. After lubricating, work the slide back and forth to ensure that it slides smoothly and easily. Install rubber boot onto backing plate.

⚠ WARNING

- **Apply grease carefully when performing the following steps. Do not allow any grease to get onto the friction surfaces of the brake shoe pads or the brake drum. Failure to heed this warning could cause diminished brake performance, possibly resulting in property damage or severe personal injury.**

4. Use a small brush to carefully apply a light coat of white lithium NLGI #2 grease (Dow Corning® BR2-Plus or equivalent) on each of the six raised bosses on the brake backing plate **(Figure 6-9, Page 6-5)**. **See preceding WARNING.**
5. Use a small brush to carefully apply a light coat of white lithium NLGI #2 grease (Dow Corning BR2-Plus or equivalent) to each end of both brake shoes and into the slots in the brake shoe mounting block as shown **(Figure 6-10, Page 6-5)**. **See preceding WARNING.**

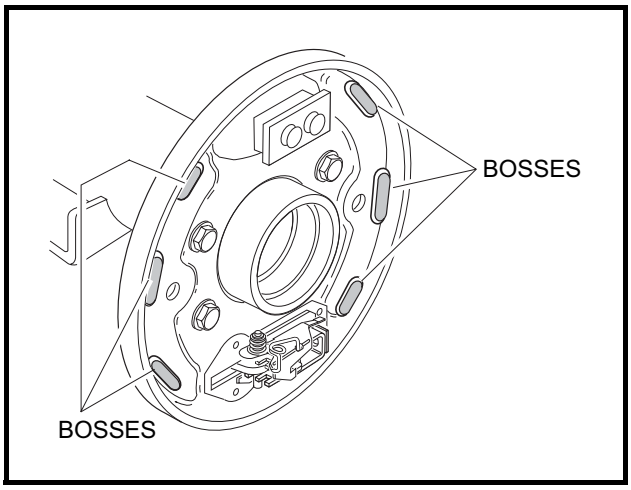

Figure 6-9 Apply Grease On Bosses

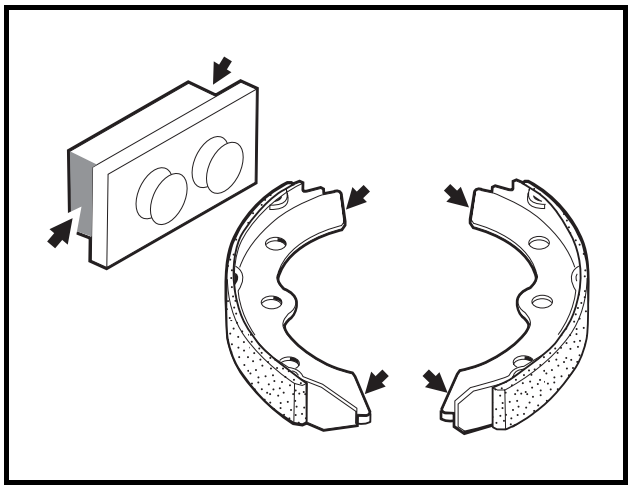

Figure 6-10 Apply Grease To Brake Shoes and Slots

6. Use a small brush to carefully apply a light coat of white lithium NLGI #2 grease (Dow Corning BR2-Plus or equivalent) to the brake adjuster assembly, adjuster wheel shoe slots, and the shaft of the adjuster wheel as shown **(Figure 6-11, Page 6-6)**. **See preceding WARNING.**
7. Install the adjuster wheel (1) and two washers (2 and 3) into the adjuster assembly **(Figure 6-7, Page 6-4)**.

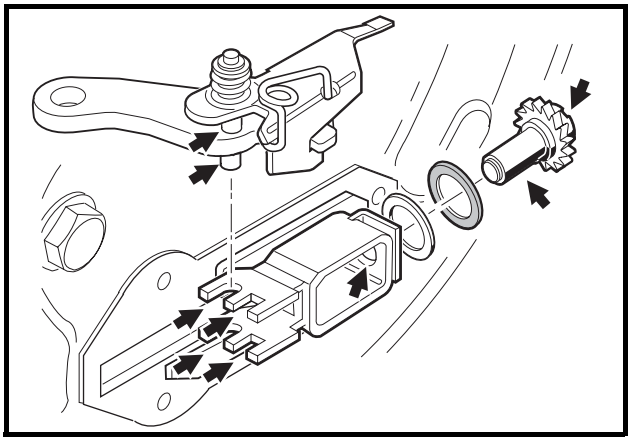

Figure 6-11 Apply Grease To Brake Adjuster

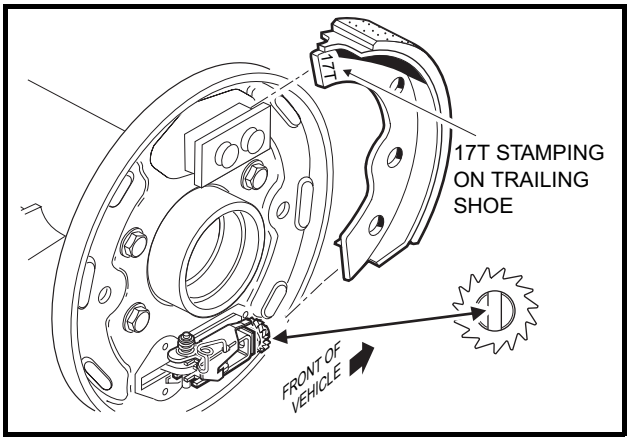

Figure 6-12 Install Adjuster Wheel, Trailing Shoe

BRAKE SHOE INSTALLATION

See General Warnings, Section 1, Page 1-1. See also Warning on Page 6-1.

1. Turn the adjusting wheel screw so that the shoe slot is vertical, then position the trailing shoe in the slots in the shoe mounting block and adjuster assembly **(Figure 6-12, Page 6-6)**. **See following NOTE**.

NOTE: *The trailing shoe has 17T stamped into the tip of the shoe flange **(Figure 6-12, Page 6-6)**. The leading shoe is stamped 17L. When installing the shoes, the stamping on both shoes should be oriented to the top of the brake assembly. When installing the shoes on the passenger side of the vehicle, the side of the trailing shoe flange marked 17T should be facing out and be visible. On the driver side, the 17L on the leading shoe should be facing out and be visible.*

*When installed on the backing plate, the **leading** shoe (stamped 17L) is **always** oriented toward the **rear** of the vehicle.*

2. Install the shoe retainer clip, using pliers to compress the clip (1) while turning the retainer pin (2) into position **(Figure 6-13, Page 6-6)**.
3. Attach the springs onto the trailing shoe already installed. Then hold the leading shoe next to the trailing shoe, correctly oriented, and attach the springs to it **(Figure 6-14, Page 6-6)**.

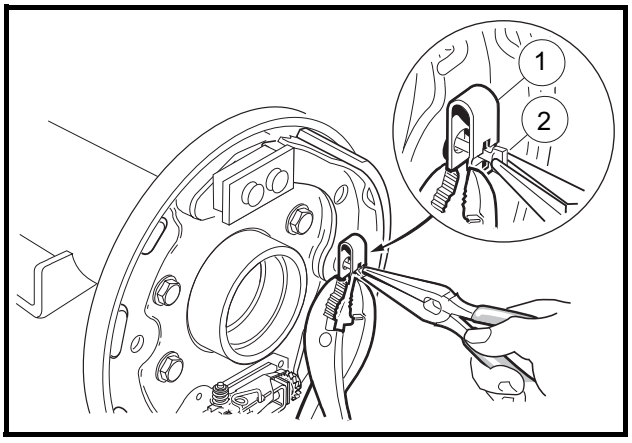

Figure 6-13 Install Trailing Shoe Retainer Clip

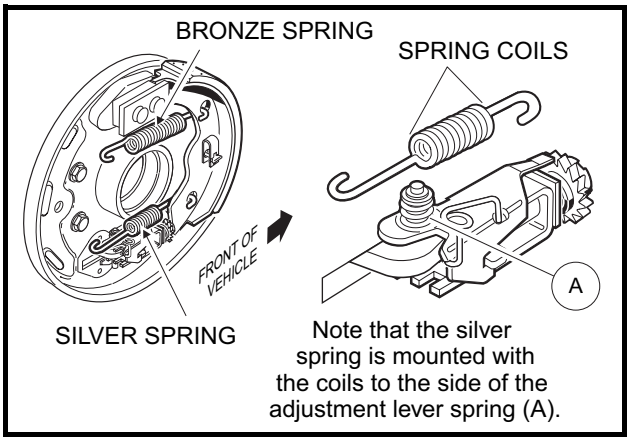
BRONZE SPRING
SPRING COILS
FRONT OF VEHICLE
A
SILVER SPRING
Note that the silver spring is mounted with the coils to the side of the adjustment lever spring (A).

Figure 6-14 Attach Springs

4. While maintaining spring attachment on both shoes, position tips of leading shoe in the mounting slots and then push shoe into place. Hold shoe in position and install retaining clip **(Figure 6-15, Page 6-7)**.

5. After the shoes are installed, move them together up and down and side to side to make sure that they will easily slide approximately 1/4 to 3/8 inch (6.3 to 9.5 mm) without binding **(Figure 6-16, Page 6-7)**.

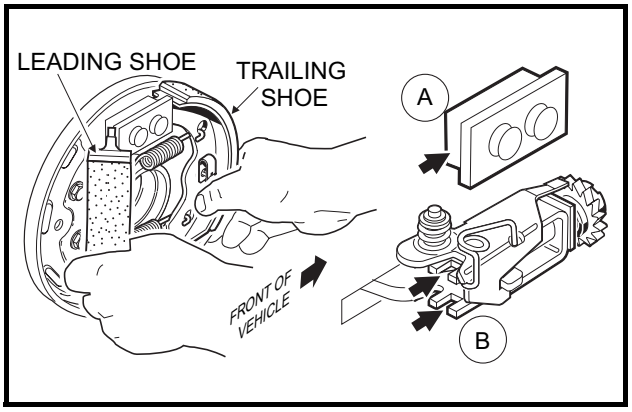

Figure 6-15 Install Leading Shoe

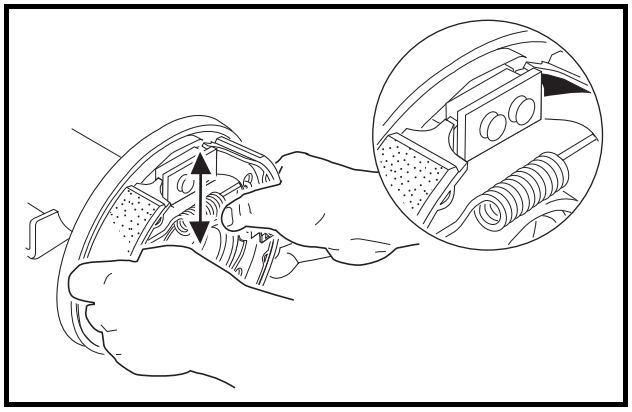

Figure 6-16 Check Shoe Positions

6. Place a flatblade screwdriver under the adjusting arm and raise the arm off of the adjusting wheel. While holding the arm up, turn the wheel upward until it stops **(Figure 6-17, Page 6-7)**. Remove the screwdriver.

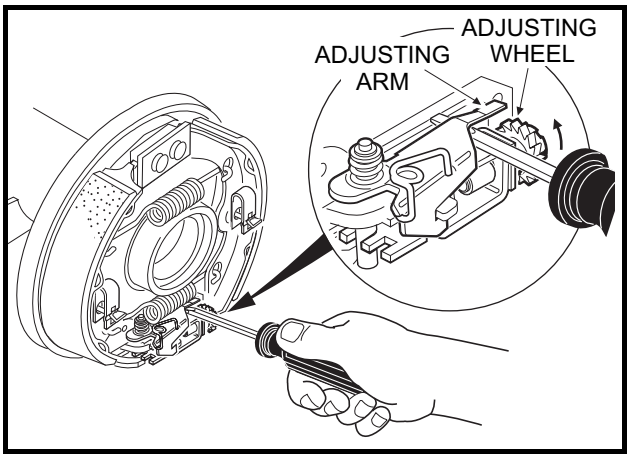

Figure 6-17 Set Adjusting Wheel

7. Install the rear axle onto the transaxle. **See following NOTE.**

NOTE: *There is a LEFT and RIGHT side axle. The splined portions on the axles that insert into the transaxle case are two different lengths. The longest length spline is the LEFT, or driver side axle.*

7.1. Insert the splined end of the axle shaft into the axle tube. Be careful not to damage the seal on the inside of the axle tube hub. Advance the shaft through to the bearing on the shaft, and rotate it to align the shaft splines with the splined bore of the differential gear. Continue advancing the shaft until the bearing on the axle is firmly seated within the axle tube hub seat.

Brake Shoe Installation, Continued:

7.2. Using 90° internal snap ring pliers (0.090 tip) (CCI P/N 1012560), attach the internal retaining ring into the axle tube hub so that it seats against the axle bearing assembly and into the machined slot in the inside wall of the axle tube hub **(Figure 6-3, Page 6-2)**.

7.3. Place a 1/4 to 3/8 - inch (6 - 10 mm) diameter rod against the retaining ring and tap lightly at four or five locations to ensure it is properly seated. **See following WARNING**.

⚠ WARNING

- **Be sure retaining ring is properly seated in groove. If ring is not properly installed, the axle assembly will separate from the transaxle and damage the axle assembly and other components. Loss of vehicle control could result in severe personal injury or death.**

⚠ CAUTION

- **Before installing axle shaft, clean any residual oil from the exposed end of the axle tube and from the oil seal area.**

8. Install the brake drum, and make sure that it is properly seated. **See following NOTE.**

NOTE: *If drum installation is difficult, the brake shoes may need to be adjusted vertically in the mounting slots.*

9. After the drum is installed, make sure the axle and drum turn freely and then install the wheel. **See Wheel Installation, Section 8, Page 8-1.**

10. Adjust brake cable equalizer. **See Brake Cable Equalizer Adjustment on page 6-9.**

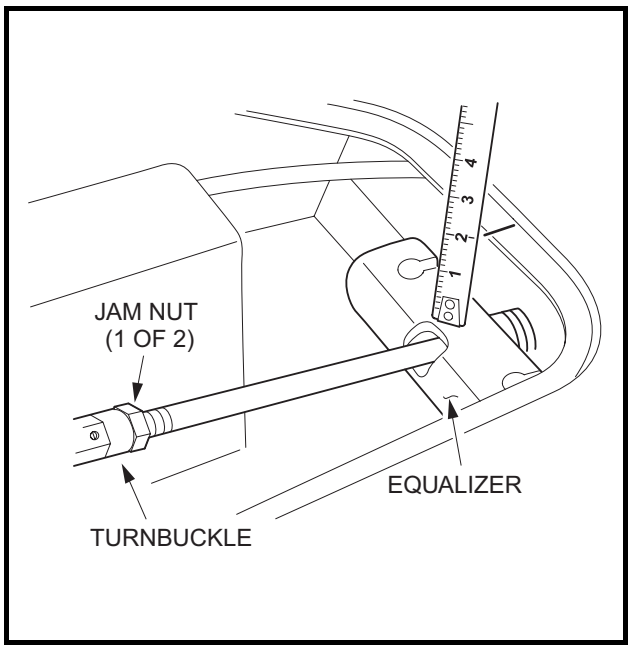

Figure 6-18 Equalizer Adjustment

BRAKE CABLE EQUALIZER ADJUSTMENT

See General Warnings, Section 1, Page 1-1. See also Warning on Page 6-1.

1. After maintenance on the brake system is complete, lower the vehicle onto the floor. With the brake pedal in the full up or at rest position, adjust the turnbuckle until the proper brake tension is achieved. The turnbuckle is properly adjusted when the distance from the top of the equalizer to the upper flange surface is 2 inches ± 1/16 inch (51 mm ± 1.6 mm).
2. Ensure that both threaded rods are visible in the witness holes of the turnbuckle before the jam nuts are tightened **(Figure 6-18, Page 6-8)**.
3. Tighten the rear jam nut first (labeled 1 of 2) to 13 ft-lb (17.5 N·m) **(Figure 6-18, Page 6-8)**, then tighten the front jam nut to 13 ft-lb (17.5 N·m). **See following WARNING.** For optimal performance, drive the vehicle and apply the brakes approximately 20 times to burnish the shoes, center the clusters, and adjust the brake mechanism.

⚠ WARNING

- **Reduced braking force could result if the jam nuts are not tightened in the proper sequence.**

4. Once steps 2 and 3 are complete, recheck the 2-inch specification listed in step 1. If the measurement has not changed, the adjustment is complete. If the measurement has changed, perform steps 1 through 3 again.
5. Replace access panel and floor mat.
   5.1. Place floor cover plate (7) over the floor opening. **See Figure 5-2, Section 5, Page 5-2.**
   5.2. Install the floor mat (2) over the pedal group. Make sure tabs on floor mat sides are beneath the sill (3). Tighten screws (1) to 53 in-lb (6 N·m). **See Figure 5-1, Section 5, Page 5-1.**

BRAKE CLUSTER REMOVAL AND INSTALLATION

See General Warnings, Section 1, Page 1-1. See also Warning on Page 6-1.

Brake Cluster Removal

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warnings, Section 1, Page 1-2.**
2. Place chocks at the front wheels and loosen the lug nuts on the rear wheels. Lift the rear of the vehicle with a chain hoist or floor jack. Place jack stands under the axle tubes to support the vehicle. **See WARNING "Lift only one end..." in General Warnings, Section 1, Page 1-2.**
3. Gain access to the pedal group by removing the floor mat and access panel. **See Pedal Group Removal, Section 5, Page 5-1.**.
4. Loosen the two jam nuts (1 and 3) on either side of turnbuckle (2) **(Figure 6-1, Page 6-2)**. Note that the forward jam nut (1) is a left-hand thread. Thread each nut approximately 1/2 inch (12.7 mm) away from the turnbuckle.
5. Loosen turnbuckle (2) to release tension on the equalizer bracket (4) that pulls on the heads of the brake cables.
6. Remove lug nuts and rear wheels and then the brake drums.

NOTE: *When servicing vehicles with self-adjusting brakes with badly worn brake shoes and when the drums cannot be removed by normal methods, perform Step 7 of Brake Shoe Removal on page 6-2, then continue with this procedure.*

Although step 7 below allows easier access to the brake shoes, it is not imperative to do so in order to remove the brake shoes.

7. Remove the axle.
   7.1. Using 90° snap ring pliers (CCI P/N 1012560), remove the axle retaining ring (1) **(Figure 6-3, Page 6-2)**.
   7.2. Pull the axle shaft (2) from the axle tube **(Figure 6-3, Page 6-2)**.
8. Remove bow tie locking pin (13) and clevis pin (12) from brake cable **(Figure 6-4, Page 6-3)**.

Brake Cluster Removal, Continued:

9. Remove four bolts (11) and lock nuts (10) that mount the brake assembly to the transaxle **(Figure 6-4, Page 6-3)**.
10. Remove brake assembly from transaxle.

BRAKE CLUSTER INSTALLATION

1. Install in reverse order of disassembly. Use new bow tie locking pins when installing brake cables.

⚠ CAUTION

- **Before installing axle shaft, clean any residual oil from the exposed end of the axle tube and from the oil seal area.**

2. Be sure bolts (11) (CCI P/N 1014153) and new lock nuts (10) (CCI P/N 1013924) are used to mount the brake assembly **(Figure 6-4, Page 6-3)**.
3. Tighten bolts to 30 ft-lb (40.6 N·m).
4. Install the rear axle onto the transaxle. **See following NOTE.**

NOTE: *There is a LEFT and RIGHT side axle. The splined portions on the axles that insert into the transaxle case are two different lengths. The longest length spline is the LEFT, or driver side axle.*

4.1. Insert the splined end of the axle shaft into the axle tube. Be careful not to damage the seal on the inside of the axle tube hub. Advance the shaft through to the bearing on the shaft, and rotate it to align the shaft splines with the splined bore of the differential gear. Continue advancing the shaft until the bearing on the axle is firmly seated within the axle tube hub seat.

4.2. Using 90° internal snap ring pliers (0.090 tip) (CCI P/N 1012560), attach the internal retaining ring into the axle tube hub so that it seats against the axle bearing assembly and into the machined slot in the inside wall of the axle tube hub.

4.3. Place a 1/4 to 3/8 - inch (6 - 10 mm) diameter rod against the retaining ring and tap lightly at four or five locations to ensure it is properly seated. **See following WARNING**.

⚠ WARNING

- **Be sure retaining ring is properly seated in groove. If ring is not properly installed, the axle assembly will separate from the transaxle and damage the axle assembly and other components. Loss of vehicle control could result in severe personal injury or death.**

5. Tighten lug nuts on rear wheels, using a crisscross pattern, to 55 ft-lb (74.6 N·m). **See Wheel Installation, Section 8, Page 8-1.**
6. Adjust the brakes. **See Brake Cable Equalizer Adjustment on page 6-9.**

BRAKE CABLE REMOVAL AND INSTALLATION

See General Warnings, Section 1, Page 1-1. See also Warning on Page 6-1.

Brake Cable Removal

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warnings, Section 1, Page 1-2.**
2. Place chocks at the front wheels.
3. Gain access to the pedal group by removing the floor mat and access panel. **See Pedal Group Removal, Section 5, Page 5-1.**
4. Loosen the two jam nuts (1 and 3) on either side of turnbuckle (2) **(Figure 6-19, Page 6-11)**. Note that the forward jam nut (1) is a left-hand thread. Thread each nut approximately 1/2 inch (12.7 mm) away from the turnbuckle.
5. Loosen turnbuckle (2) until the bolt (5) is free of the turnbuckle.

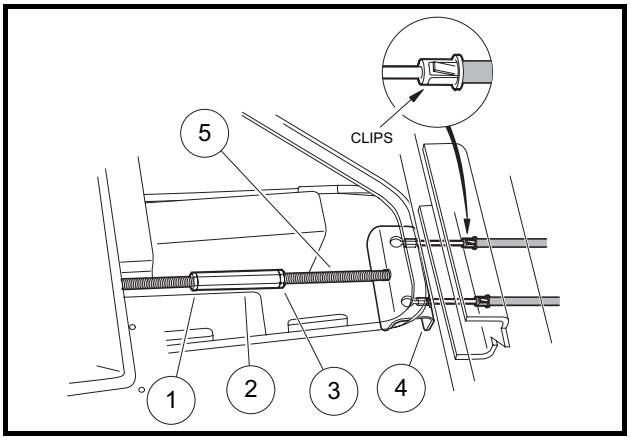

Figure 6-19 Loosen Brake Cables

6. Rotate the bolt (5) and equalizer bracket (4) to the upright position then slip the cable heads out of the bracket.
7. Remove nut (1) from the bolt (2) that secures front of the leaf spring **(Figure 6-21, Page 6-12)**. Do not remove bolt (2).
8. Remove the mounting tab (3) of the brake cable from the bolt.
9. Using brake cable release tool (CCI P/N 102555501), compress the retaining clips on the end of the cable housing enough to slide the cable end out of the hole in the frame.
10. Remove bow tie locking pin (1) and the clevis pin (2) from the brake lever on each wheel and pull the clevis (3) away from the lever. **(Figure 6-20, Page 6-12)**.
11. Using brake cable release tool (CCI P/N 102555501), compress the retaining clips on the end of the cable housing enough to slip the cable end out of the bracket (4) and remove the brake cable from the vehicle.

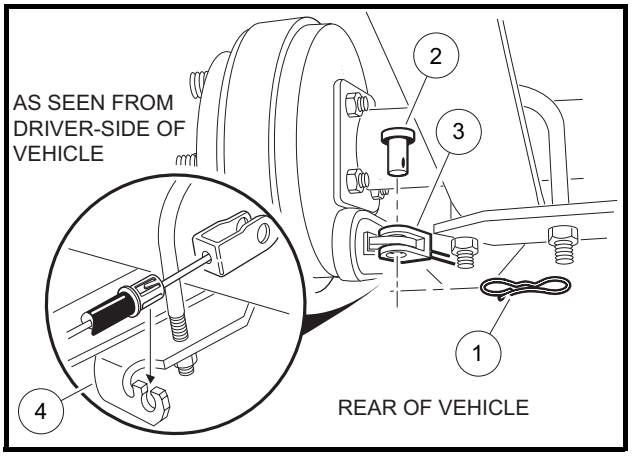

Figure 6-20 Disconnect Cables at Rear Brakes

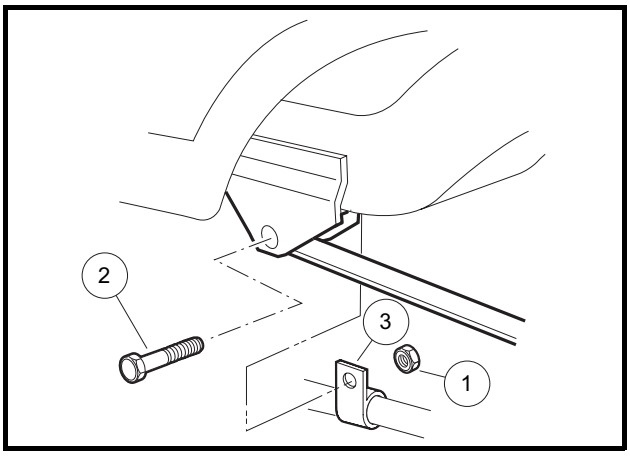

Figure 6-21 Brake Cable Mounting Tab

Brake Cable Installation

NOTE: *The driver-side and passenger-side brake cables are not interchangeable. The driver-side cable is shorter than the passenger-side cable. Make sure the correct cable is used on the correct side.*

Be sure to orient the cable so that the clevis end goes to the wheel rather than to the equalizer bracket.

1. Insert the end of the new brake cable through the hole in the frame **(Figure 6-19, Page 6-11)**. Push on the cable housing so the clips on the housing ends secure the housing in the hole.
2. Hold the bolt (5) and the equalizer bracket (4) in the upright position and slip the cable head through the hole on top of the bracket. Pivot the equalizer to the horizontal position to capture the cable heads in the equalizer.
3. Insert the rear cable housing into the shock mount bracket (4) **(Figure 6-20, Page 6-12)**. Push the cable housing end into the bracket to ensure the clips on the housing end secure the cable in position.
4. At the rear wheel brake, connect the cable to the brake actuator arm using new clevis pin (2) and new bow tie locking pin (1) **(Figure 6-20, Page 6-12)**.
5. Place tab (3) on cable housing over the forward leaf spring mounting bolt (2) **(Figure 6-21, Page 6-12)**. Install nut (1). Tighten nut to 18.4 ft-lb (25 N·m).
6. Adjust the brakes. **See Brake Cable Equalizer Adjustment on page 6-9.**

SECTION 7 – STEERING AND FRONT SUSPENSION

⚠ DANGER

- **See General Warnings, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warnings, Section 1, Page 1-1.**

GENERAL INFORMATION

Steering is controlled through a rack and pinion steering assembly that is connected by a steering column to a steering wheel. No manual adjustment to the rack and pinion gear assembly is required. A spring loaded self-adjusting mechanism is incorporated into the assembly.

STEERING WHEEL

See General Warnings, Section 1, Page 1-1.

STEERING WHEEL REMOVAL

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warnings, Section 1, Page 1-2.**
2. If scorecard holder is secured to steering wheel with screws, remove the two mounting screws (8) **(Figure 7-3, Page 7-3)**.
3. Remove the scorecard holder plate (1).
4. Match mark the steering wheel (7) and steering column shaft (9) so when the steering wheel is removed it can be placed back in exactly the same position on steering column shaft.
5. Loosen the steering wheel bolt (6) and back it off approximately 1/4 inch (6 mm). Do not remove the bolt.
6. If it is difficult to remove the steering wheel, use the steering wheel puller (CCI P/N 102061201) to remove steering wheel.
   - 6.1. Place the puller anvil (4) through the top opening of the steering wheel **(Figure 7-1, Page 7-2)**.
   - 6.2. Insert the anvil feet through the two slots in the base plate (marked "B") (5) as shown **(Figure 7-1, Page 7-2)**.
   - 6.3. Rotate the anvil screw (6) clockwise until the base plate contacts the bottom of the steering wheel where it attaches to the steering column **(Figure 7-2, Page 7-2)**.
   - 6.4. Using a 1/2 inch drive air impact wrench, tighten the anvil screw (6) until the steering wheel breaks free from the steering shaft.
   - 6.5. Remove the steering wheel puller.

Steering Wheel Removal, Continued:

6.6. Remove the steering wheel bolt (6) and the steering wheel (7) from the steering column (9) **(Figure 7-3, Page 7-3)**.

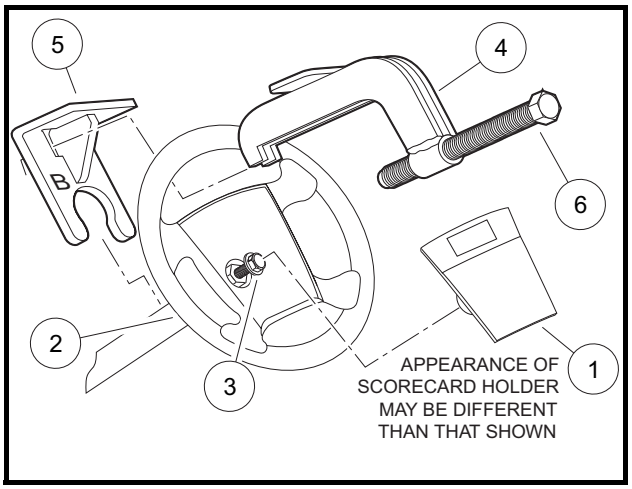

Figure 7-1 Steering Wheel Puller

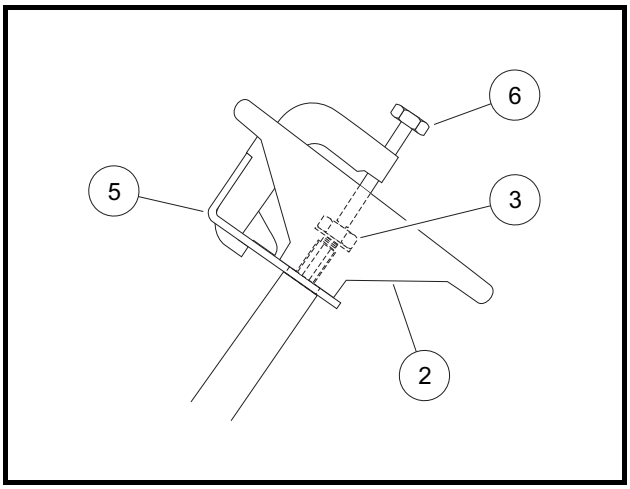

Figure 7-2 Steering Wheel Puller

STEERING WHEEL INSTALLATION

NOTE: *To minimize corrosion and to make future removal of the steering wheel easier, apply a small amount of oil or anti-seize compound to steering shaft before installing the steering wheel.*

1. Install the steering wheel (7) on the steering column shaft (9). Be sure to align the match marks placed on the wheel and steering column in step 4 above **(Figure 7-3, Page 7-3).**
2. Install the steering wheel bolt (6) and tighten to 13 ft-lb (17.6 N·m).
3. Install the scorecard plate (1).
4. If required, install the plate mounting screws (8). Tighten screws to 16 in-lb (1.8 N·m).

STEERING COLUMN

See General Warnings, Section 1, Page 1-1.

STEERING COLUMN REMOVAL

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warnings, Section 1, Page 1-1.**
2. Remove the steering wheel as previously instructed.
3. Remove the dash insert, instrument panel, dash assembly, and front bumper. **See Section 4 – Body and Trim.**

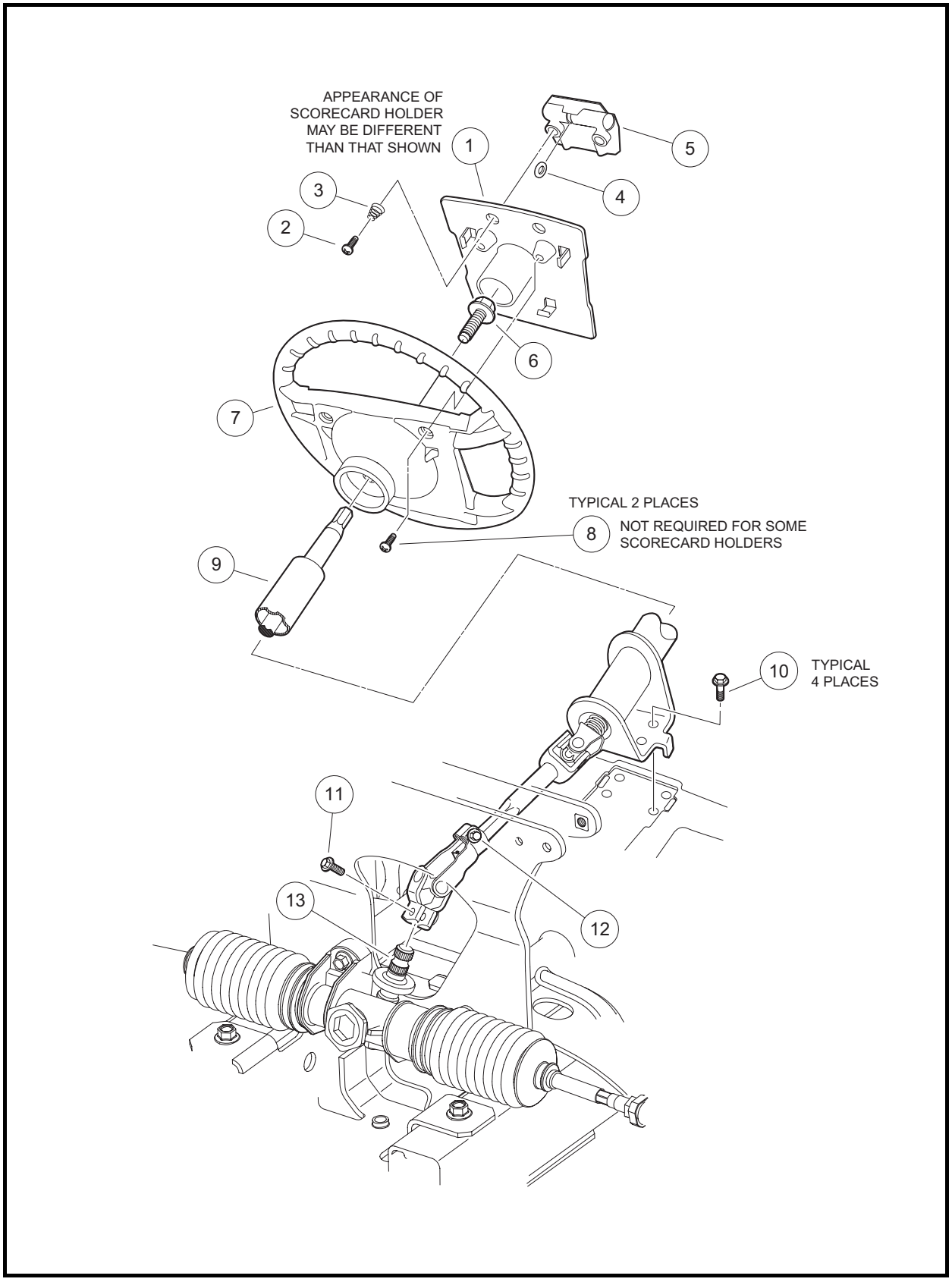

Figure 7-3 Steering Column

Steering Column Removal, Continued:

4. Loosen the bolt (11) that attaches the steering column universal joint to the stud on the steering gear **(Figure 7-3, Page 7-3).**
5. Remove the four bolts (10) that attach the steering column to the frame.
6. Remove the steering column from the vehicle.

STEERING COLUMN INSTALLATION

1. For ease of assembly and to prevent corrosion, apply a light coat of anti-seize or lubricating compound to the splined stud extending from the steering gear.
2. Insert the end of the steering column with the universal joint through the front underbody. Position universal joint over splined stud on the steering gear. Leave bolt (11) loose until steering column is mounted to frame in step 3 **(Figure 7-3, Page 7-3)**.
3. Align the holes in the steering column mounting bracket with holes in the vehicle frame. Secure column to frame with four bolts (10). Tighten bolts to 18.4 ft-lb (25 N·m).
4. Tighten universal joint bolt (11) to 18.4 ft-lb (25 N·m). Verify bolt (12) torque is 18.4 ft-lb (25 N·m).
5. Install front bumper, dash assembly, dash insert, and instrument panel. **See Section 4 – Body and Trim.**

RACK AND PINION

See General Warnings, Section 1, Page 1-1.

RACK AND PINION REMOVAL

1. Remove the front bumper as instructed. **See Section 4 – Body and Trim.**
2. Remove the retaining pins (1) and tie rod end retaining nuts (2) **(Figure 7-4, Page 7-5)**.
3. Remove the tie rod ends (3) from the spindle assemblies.
4. Remove the three bolts (5) from the steering rack and pinion assembly mounting bracket.
5. Remove the bolt (6) from the universal joint, then remove the rack and pinion assembly and universal joint from the vehicle.

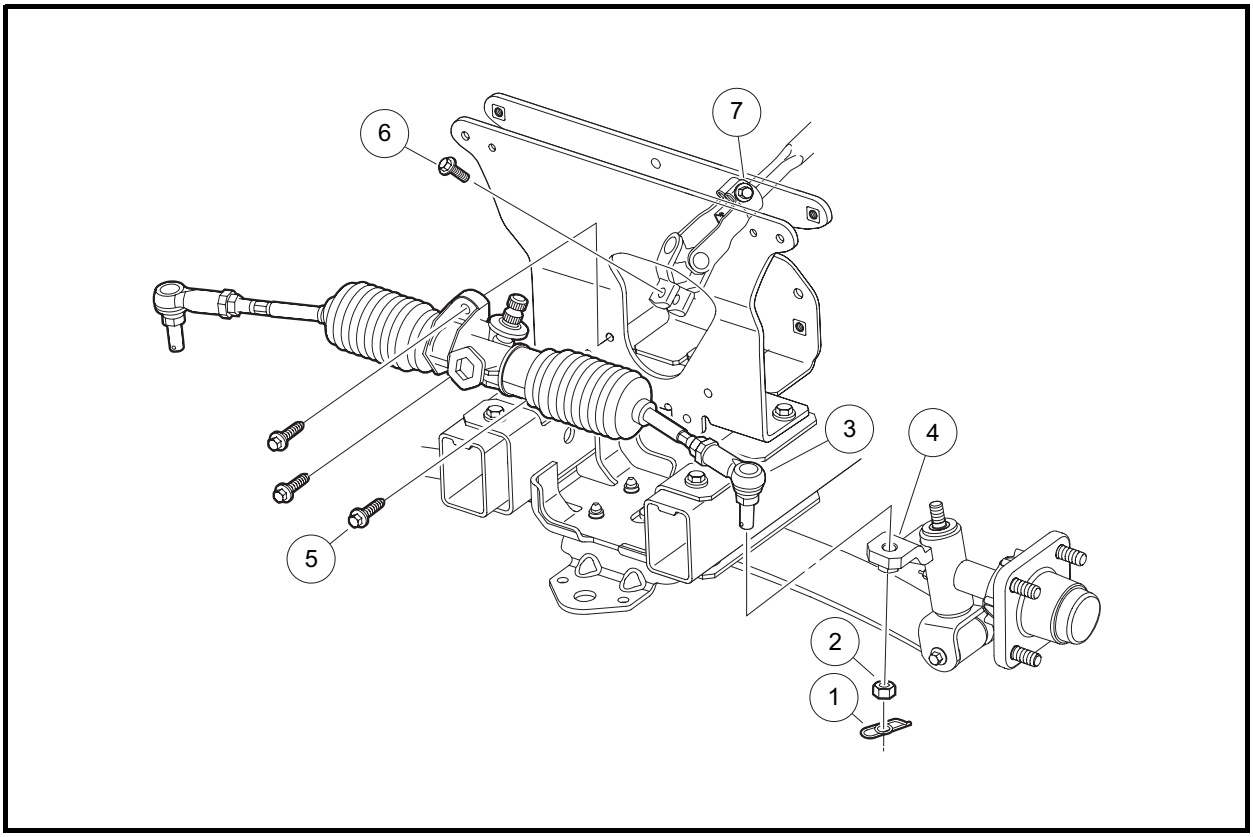

Figure 7-4 Rack and Pinion Removal

RACK AND PINION DISASSEMBLY

1. Remove the two tie rod ends (12) and inspect for excessive wear **(Figure 7-5, Page 7-6)**.
2. Remove clamps (10 and 21) from bellows (9) **(Figure 7-5, Page 7-6)**.

NOTE: *If the dust seal bellows are secured with a metal clamp, remove the clamp. Do not reuse the clamp when the rack and pinion is reassembled. Use a plastic wire tie to secure the dust seal bellows.*

3. Remove the two hex nuts (11) and slide off both of the dust seal bellows (9) from ball joints (8).
4. Remove rack screw nut (14), rack guide screw (13), rack guide pressure spring (15) and the rack guide (16).
5. Remove the universal joint assembly from the pinion (5) by removing the bolt and then sliding off the universal joint.
6. Remove the dust seal **(Figure 7-6, Page 7-7).**
7. Remove the large snap ring (4) **(Figure 7-7, Page 7-7)**.
8. Remove pinion (5) from the housing (17) **(Figure 7-8, Page 7-7)**. If removal is difficult, install the universal joint onto the pinion and place a fork or a large open-end wrench under the universal joint **(Figure 7-8, Page 7-7)**. Gently pry the pinion from the housing.
9. Remove the universal joint from the pinion (5).

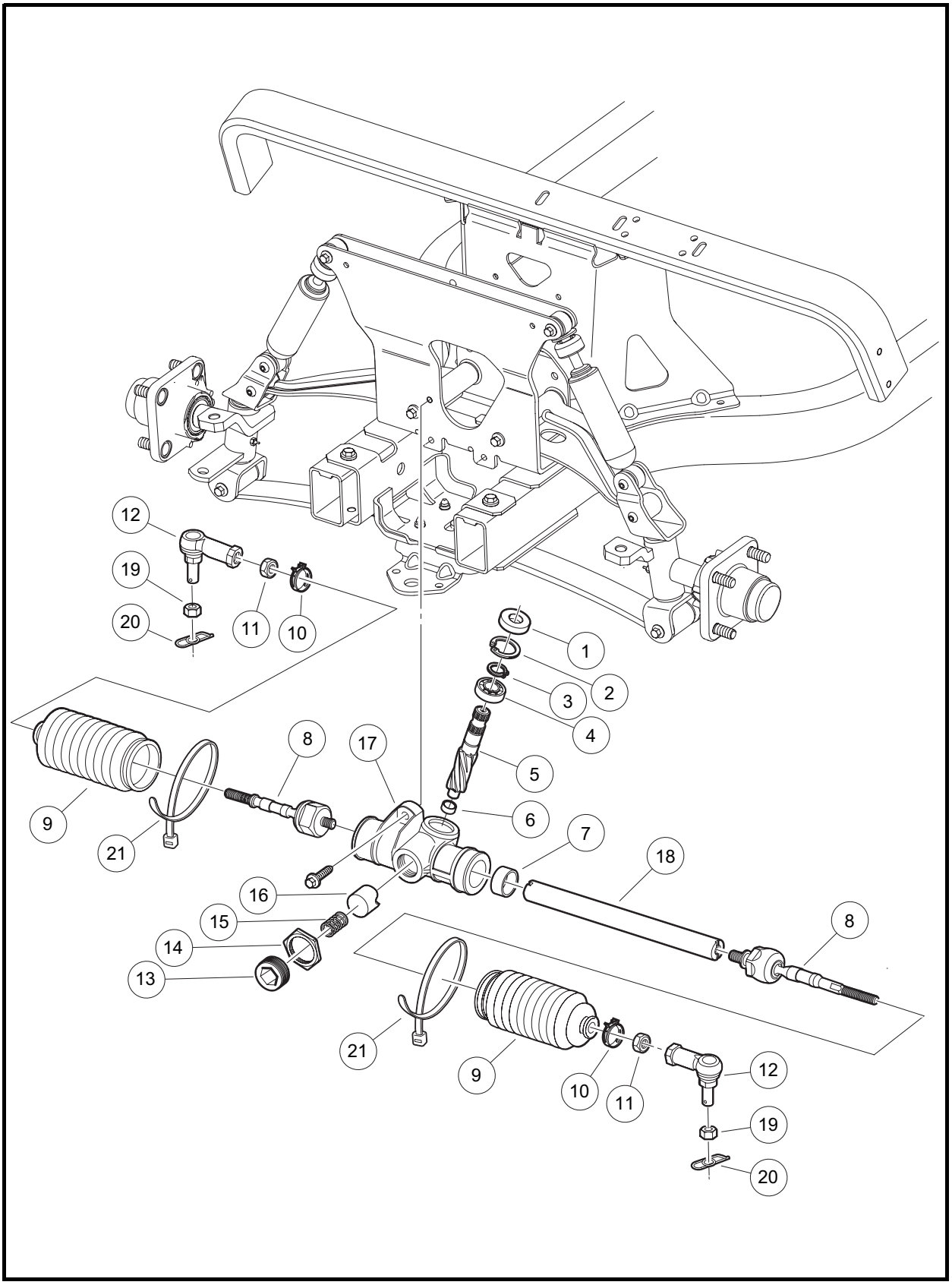

Figure 7-5 Steering Gear

Rack and Pinion Disassembly, Continued:

10. If the ball bearing (4) **(Figure 7-5, Page 7-6)** has been damaged, remove the C-type stop ring (16) **(Figure 7-7, Page 7-7)** and press the bearing off **(Figure 7-9, Page 7-7)**.
11. Inspect the bushing (7) and needle bearing (6) for excessive wear. If wear is excessive, replace the entire assembly **(Figure 7-5, Page 7-6)**.
12. Inspect the ball joints (8) for wear. If one or both of the ball joints (8) are excessively worn, remove and replace the ball joint from the rack (18).
13. Remove the rack (18) from housing (17).

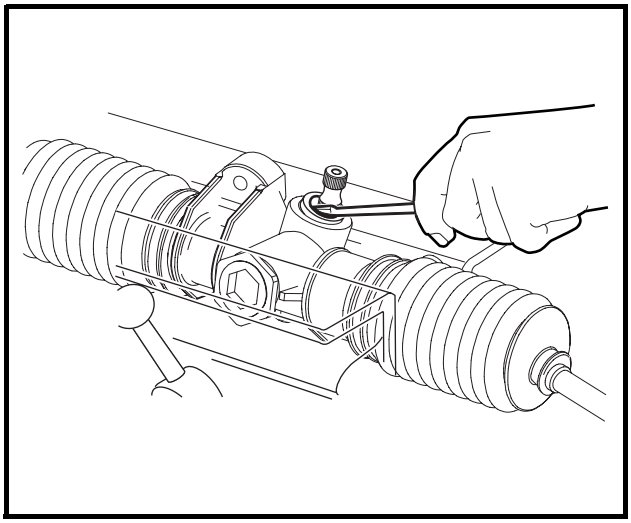

Figure 7-6 Remove Dust Seal

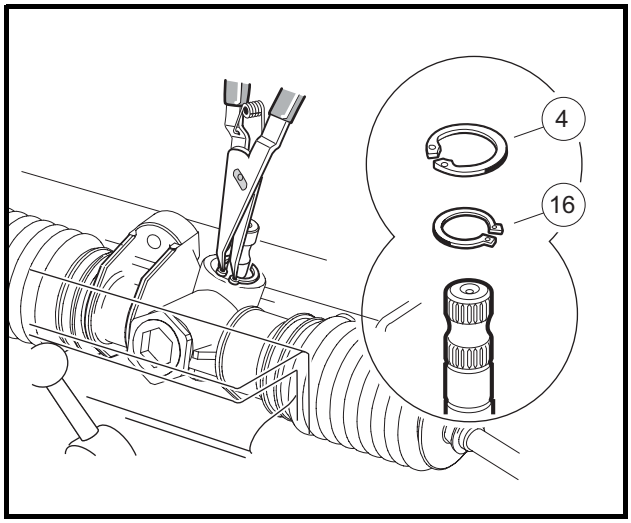

Figure 7-7 Pinion Snap Rings

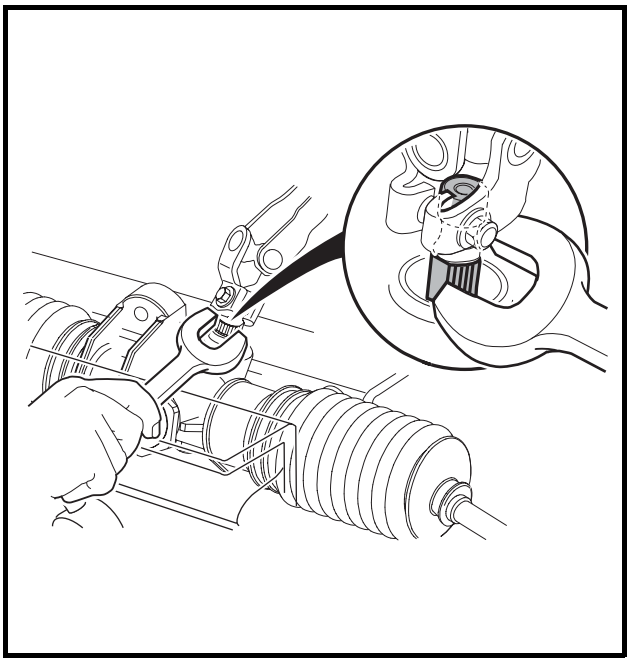

Figure 7-8 Remove Pinion from Housing

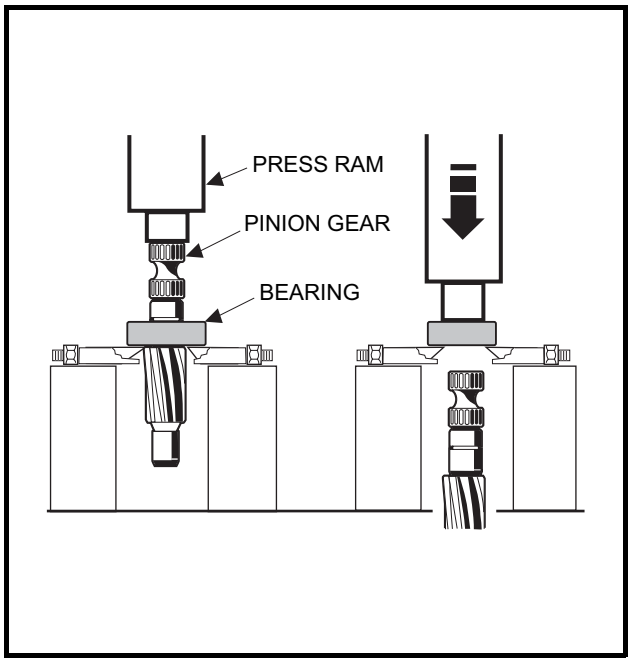

Figure 7-9 Remove Bearing from Pinion

RACK AND PINION ASSEMBLY

1. Apply a liberal amount of EP grease to the teeth of the rack (18), then slide the rack through the bushing (7) and housing (17) **(Figure 7-5, Page 7-6)**.

CAUTION

- **In step 2, do not press against the outer race of the bearing.**

2. If the pinion bearing (4) was removed, grease a new bearing before installation. Press new bearing onto pinion shaft, exerting all pressure on the inner race. Then install the C-type stop ring (3). **See previous CAUTION.**
3. Install pinion (5) and bearing (4) assembly into the housing (17). Make sure the rack gear teeth will mesh with the gear teeth on the pinion. The rack may need to be rotated slightly while lightly tapping on the pinion-bearing assembly with a rubber mallet. **See following CAUTION.**

CAUTION

- **Do not force the pinion-bearing assembly into the housing. The gear teeth or the small bearing could be damaged.**

4. Install the large snap ring (2).
5. Use a socket to apply pressure evenly and press in a new dust seal **(Figure 7-10, Page 7-9)**.
6. Apply a small amount of grease to the rack guide (16) where it comes into contact with the rack (18) **(Figure 7-5, Page 7-6)**.
7. Install the ball joints (8) onto the rack (18) by securing the rack in a vise using wood blocks between the rack and the jaws of the vise to protect the rack from damage. Tighten the ball joints to 60 ft-lb (81 N·m).
8. Tap a flange into the notch on the rack **(Figure 7-11, Page 7-9)**.
9. Place a few drops of Loctite 222 to the threads of the screw (14) **(Figure 7-5, Page 7-6)**.
10. Install the rack guide (16), pressure spring (15) and screw (13). The screw should be threaded-in until it bottoms out and then backed out 1/4 turn **(Figure 7-5, Page 7-6)**.
11. Insert a 3/8-inch, 1/4-drive, deep-well socket into the steering column end of the universal joint (2) and tighten the bolts (1) to 15 ft-lb (20.3 N·m) **(Figure 7-13, Page 7-9)**.
12. Use a torque wrench connected to the 3/8-inch deep-well socket to measure the resistance of the rack and pinion. Rotational resistance should measure 7 to 15 in-lb (0.8 to 1.7 N·m).
13. If measured resistance is not 7 to 15 in-lb (.8 to 1.7 N·m), adjust the screw (13) until correct setting is achieved. Tighten the nut (14) to 28 ft-lb (38 N·m) **(Figure 7-12, Page 7-9)**.

NOTE: *When tightening the nut (14), make sure the screw (13) does not change adjustment* ***(Figure 7-12, Page 7-9)****.*

14. Install the two dust seal bellows (9) **(Figure 7-5, Page 7-6)**.
15. Install new bellows clamps (wire ties) (10 and 21).
16. Install the tie rod ends (12) to each end of rack (18). Tighten the tie rod end jam nuts (11) to 20 ft-lb (27 N·m) **(Figure 7-5, Page 7-6)**.

RACK AND PINION INSTALLATION

1. To minimize corrosion, apply a light coat of anti-seize lubricating compound to the splined portion of the steering column universal joint.
2. Align the flat portion of the shaft (13) spline with the bolt hole in the upper universal joint and then slide the shaft into the universal joint. Install the bolt and tighten to 18.4 ft-lb (25 N·m) **(Figure 7-3, Page 7-3)**.
3. Simultaneously position the assembly over the mounting holes and slide the universal joint over the square end of the steering column.
4. Install three screws to secure the assembly to the vehicle. Tighten screws to 22 ft-lb (30 N·m).
5. Install the tie rod ends (3) into the left- and right-hand spindle tabs (4), and then install the retaining nuts (2) **(Figure 7-4, Page 7-5)**. **See following WARNING.**

⚠ WARNING

- **Do not operate vehicle until toe-in is adjusted and ball joints are secured.**

6. Adjust the toe-in. **See Toe-in Adjustment on page 7-11.**

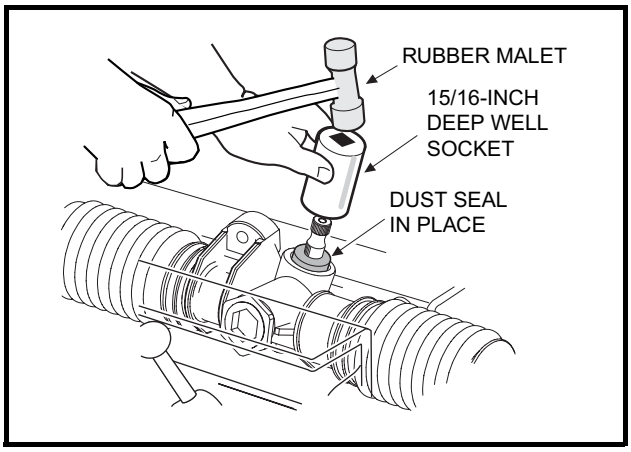

Figure 7-10 Press In Dust Seal

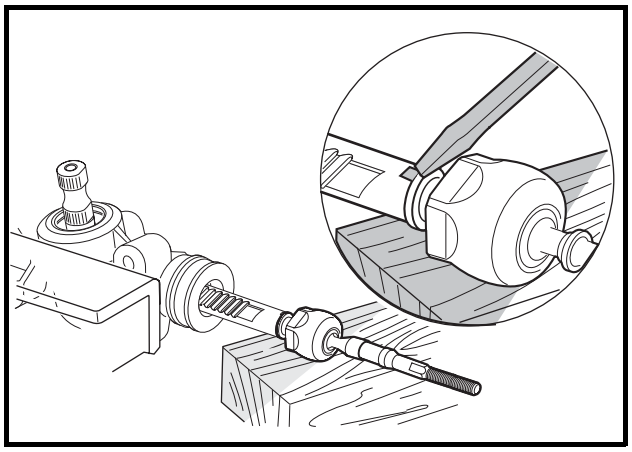

Figure 7-11 Install Ball Joint

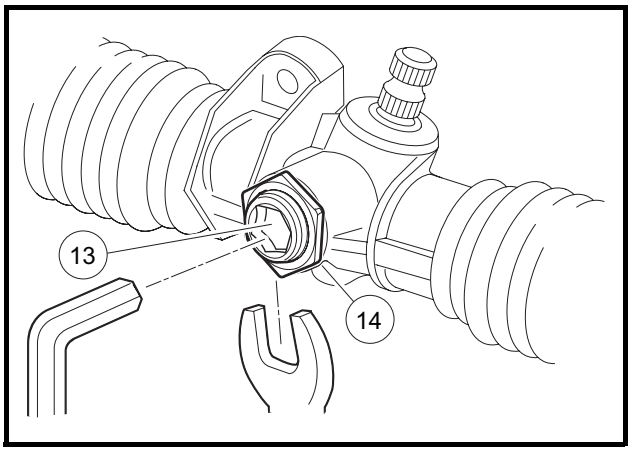

Figure 7-12 Rack and Pinion Adjustment

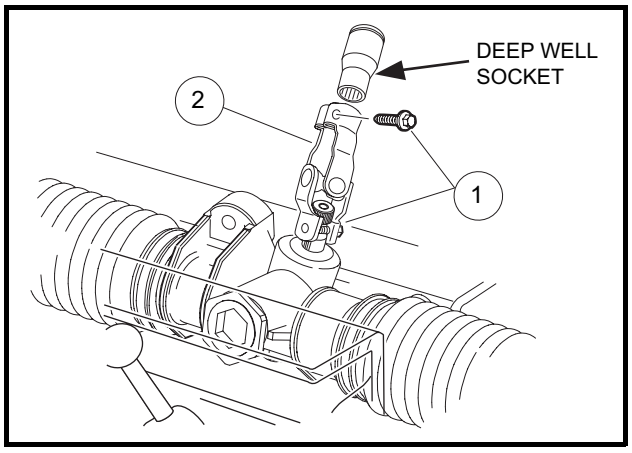

Figure 7-13 Rack and Pinion Resistance

FRONT SUSPENSION

See General Warnings, Section 1, Page 1-1.

LUBRICATION

Two grease fittings are provided (one in each spindle housing). Lubricate these fittings at the recommended interval with the proper lubricant. **See Periodic Lubrication Schedule, Section 10, Page 10-3.**

CAUTION

- **To ensure proper lubrication, raise front of vehicle to lubricate. See General Warnings, Section 1, Page 1-1.**

WHEEL ALIGNMENT

Wheel alignment is limited to equalizing the camber angle of each front wheel and adjusting toe-in of the front wheels.

NOTE: *Prior to making any front suspension adjustments, inspect components for wear or damage and repair or replace as necessary.*

Camber Adjustment

1. Check each front wheel with a framing square. At the floor (or ground), there should be an equal amount of space between each tire and the framing square **(Figure 7-14, Page 7-11)**.
2. Loosen, but do not remove, the four bolts (17) that secure the leaf spring (13) to the bottom spring plate (16) **(Figure 7-19, Page 7-16). See also Figure 7-15, Page 7-11**.
3. Loosen, but do not remove, the hex nut (8) on the adjustment eccentric (7) **(Figure 7-15, Page 7-11)** in the center of the spring. **See also Figure 7-19, Page 7-16.**
4. Use a 7 mm deep well socket to rotate the eccentric **(Figure 7-15, Page 7-11)**.
5. After adjusting camber, use a crisscross pattern to tighten the four spring retaining bolts (17) **(Figure 7-19, Page 7-16)** to 23 ft-lb (31 N·m). Then roll the vehicle forward one full tire revolution and recheck the camber. **See also Figure 7-14, Page 7-11**.
6. Tighten the hex nut (8) on the adjustment eccentric (7) to 10 ft-lb (13.5 N·m) **(Figure 7-15, Page 7-11)**. **See also Figure 7-19, Page 7-16**.

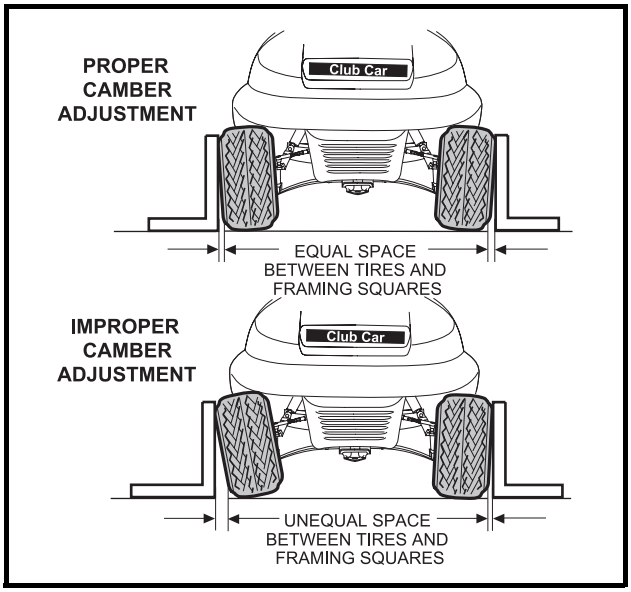

Figure 7-14 Check Camber

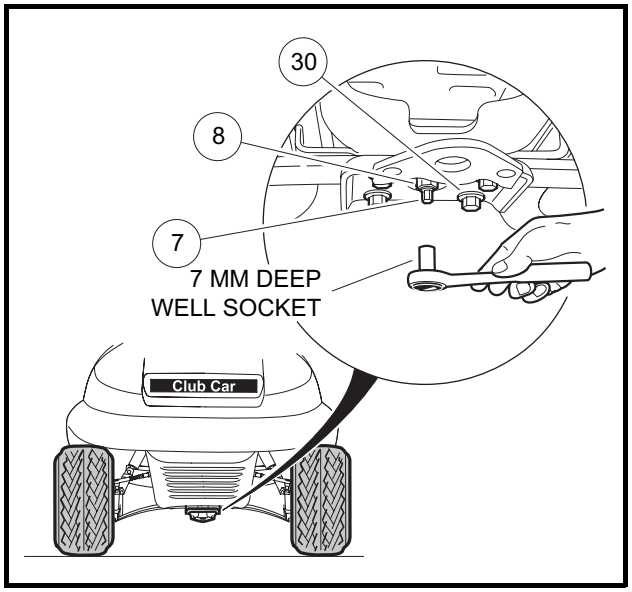

Figure 7-15 Adjust Camber

Toe-in Adjustment

1. On a level surface, roll the vehicle forward, then stop. Make sure the front wheels are pointed straight ahead. Do not turn the steering wheel again during this procedure.
2. On each front tire, mark (as closely as possible) the center of the tread face that is oriented toward the rear of the vehicle. The marks should be even with the bottom surfaces of the vehicle frame.
3. Measure the distance between the marks on the rear-facing surfaces of the tires, and then roll the vehicle forward one and one-half wheel revolution until the marks appear on the forward facing surfaces of the tires at about the same height from the floor **(Figure 7-16, Page 7-11)**.

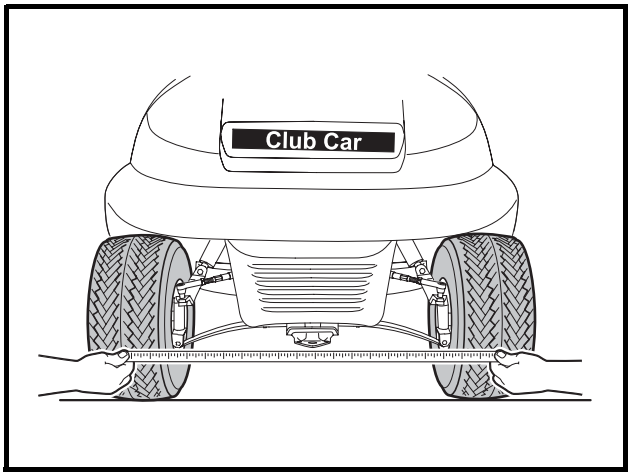

Figure 7-16 Check Toe-In

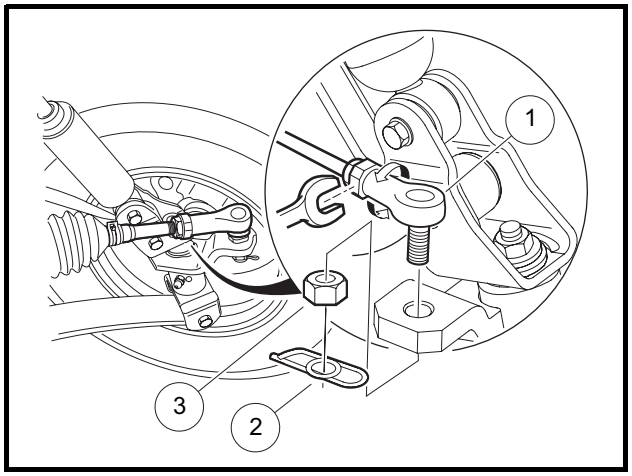

Figure 7-17 Adjust Toe-In

4. Measure the distance between the marks on the forward-facing surfaces of the tires **(Figure 7-16, Page 7-11)**.

NOTE: *The front measurement must be less than the rear measurement.*

Toe-in Adjustment, Continued:

5. Subtract the measurement on the front of the tires from the measurement on the rear of the tires. The difference is the toe-in. Proper toe-in is 5/16 inch (7.8 mm).
6. If adjustment is necessary, proceed as follows:
   6.1. Loosen the jam nut on each tie rod end (1) **(Figure 7-17, Page 7-11)**.
   6.2. Remove the retaining pin (2) and nut (3) that secure the tie rod to the spindle. Raise the male threads out of the spindle.
   6.3. Rotate tie rod end in or out as required.
   6.4. Attach male thread to spindle tab and recheck the toe-in.
   6.5. As necessary repeat steps 6.1 through 6.4.
   6.6. Secure tie rod ends with nuts (3) and tighten to 70 ft-lb (95 N·m). Install retaining pins (2).
   6.7. Tighten jam nuts. Tighten to 26 ft-lb (35 N·m).
   6.8. After toe-in adjustment is made and with wheels in the straight ahead position, the steering wheel should be at the center of its travel. There should be equal travel to the left and right.

FRONT SUSPENSION COMPONENTS

See General Warnings, Section 1, Page 1-1.

TIE ROD END REMOVAL

1. Loosen jam nuts (13) to allow later rotation of the tie rod ends (12) **(Figure 7-18, Page 7-15)**.
2. Remove the retaining pins (15) and retaining nuts (14).
3. Lift male thread of tie rod from the hole in the spindle tab.
4. Remove the tie rod ends from the steering gear.
5. To minimize corrosion, apply a light coat of anti-seize lubricating compound to the threads where the tie rod ends are installed.

TIE ROD INSTALLATION

1. Thread tie rod ends (12) onto steering gear to a depth of 1/2 inch (12.5 mm) **(Figure 7-18, Page 7-15)**.

⚠ WARNING

- **The tie rod ends must be threaded into the rod at least 5/16 of an inch (8 mm). Failure to thread deep enough may cause tie rod ends to separate from the rod during adjustment or while being operated, possibly resulting in loss of vehicle control and severe personal injury.**

2. Install tie rod ends (12) into the spindle tabs. Install the retaining nuts (14) and retaining pins (15) **(Figure 7-18, Page 7-15)**.
3. Adjust wheel toe-in. **See Toe-in Adjustment on page 7-11.**

LEAF SPRING REMOVAL

1. Loosen lug nuts on both front wheels and raise front of vehicle with a chain hoist or floor jack. Place jack stands under the aluminum rails of the vehicle frame just aft of the front suspension. Lower the vehicle onto the jack stands. **See General Warnings, Section 1, Page 1-1.**
2. Remove both front wheels.
3. Remove the bolts (8) from the bottom of each kingpin (7) **(Figure 7-19, Page 7-16)**.
4. Remove the four bolts (17) and bottom spring plate (16).
5. Remove leaf spring (13).
6. Check the condition of the urethane bushings (15) and steel sleeves (14). Replace any that are worn or damaged.

LEAF SPRING INSTALLATION

1. Install urethane bushings (15) and steel sleeves (14) into leaf spring eyes **(Figure 7-19, Page 7-16)**.
2. Install leaf spring (13), bottom spring plate (16), and four bolts (17). Using a crisscross pattern sequence, tighten bolts to 23 ft-lb (31 N·m).
3. Install spring in kingpins (7) with bolts (8). Tighten to 17 ft-lb (23 N·m).
4. Install the wheels and finger tighten the lug nuts.
5. Lower the vehicle and finish tightening lug nuts (using a crisscross pattern) to 55 ft-lb (74.6 N·m).
6. Adjust camber and toe-in. **See Wheel Alignment on page 7-10.**

KINGPIN AND STEERING SPINDLE REMOVAL

1. Remove the front hub. **See Front Hub Removal on page 7-17.**
2. Remove retaining pins (15) and nuts (14), then remove tie rod ends (12) from the tabs on the spindles **(Figure 7-18, Page 7-15).**
3. Remove the nut (1) and conical washer (2) from the top of the kingpin (7) **(Figure 7-19, Page 7-16)**.
4. Raise the upper clevis from the kingpin.
5. Slide the spindle (3) off the kingpin (7).
6. Remove the wave washer (6) and inspect it. If the washer is broken or has a wave bottom to wave crest height dimension of less than 0.040 inch (1 mm), it must be replaced.
7. Remove bolt (8) from bottom of kingpin (7) and remove kingpin.
8. Inspect the kingpin and spindle. If either is worn or damaged, it must be replaced.
9. Inspect the bushings (4). If the bushings are worn or damaged, remove them and press in new ones.

KINGPIN AND STEERING SPINDLE INSTALLATION

1. Inspect all parts and replace them as necessary.
2. Install the kingpin (7) over the leaf spring eye. Insert the bolt (8) **(Figure 7-19, Page 7-16)**. Tighten the bolt to 17 ft-lb (23 N·m).
3. Install the wave washer (6) on the kingpin.
4. Install the steering spindle on the kingpin. Place upper clevis over the kingpin threads and install conical washer (2) and nut (1). Tighten the nut to 50 ft-lb (68 N·m).

Kingpin and Steering Spindle Installation, Continued:

5. Attach the tie rod ends (12) to the spindle tabs, than install and tighten the nuts (14) to 70 ft-lb (95 N·m). Install the retaining pins (15) **(Figure 7-18, Page 7-15)**.
6. Install front hub and wheel. **See Hub Installation on page 7-17.**

CONTROL ARM REMOVAL

1. Loosen lug nuts on both front wheels and raise front of the vehicle with a chain hoist or floor jack. Place jack stands under the front aluminum rails of the vehicle frame and lower the vehicle onto the jack stands.
2. Remove wheel.
3. Remove bolts (17) and move rack and pinion to allow clearance for bolt (19) **(Figure 7-18, Page 7-15)**.
4. Remove bolts (11 and 19).
5. Remove the control arm (6).
6. Inspect the bushings (7) and sleeves (8 and 9) in the control arm and replace them if necessary.

CONTROL ARM INSTALLATION

1. Install the control arm in reverse order of removal. Tighten the control arm bolts (11 and 19) to 20 ft-lb (27 N·m) **(Figure 7-18, Page 7-15)**. Tighten three rack and pinion mounting bolts (17) to 22 ft-lb (30 N·m)
2. Install the wheels and adjust the wheel alignment as instructed on page 7-10.

SHOCK ABSORBER REMOVAL

1. Inspect the shock absorbers for fluid leakage at the point where the shaft enters the shock absorber body. Leaking shock absorbers should be replaced.
2. Remove the upper bolt (18) **(Figure 7-18, Page 7-15)**.
3. Remove the lower bolt (10).
4. Remove the shock absorber.

SHOCK ABSORBER INSTALLATION

NOTE: *When installing shock absorbers, make sure front shocks have identical part numbers.*

1. Install the shock absorber by reversing the removal procedure.
2. Tighten the bolts to 20 ft-lb (27 N·m).

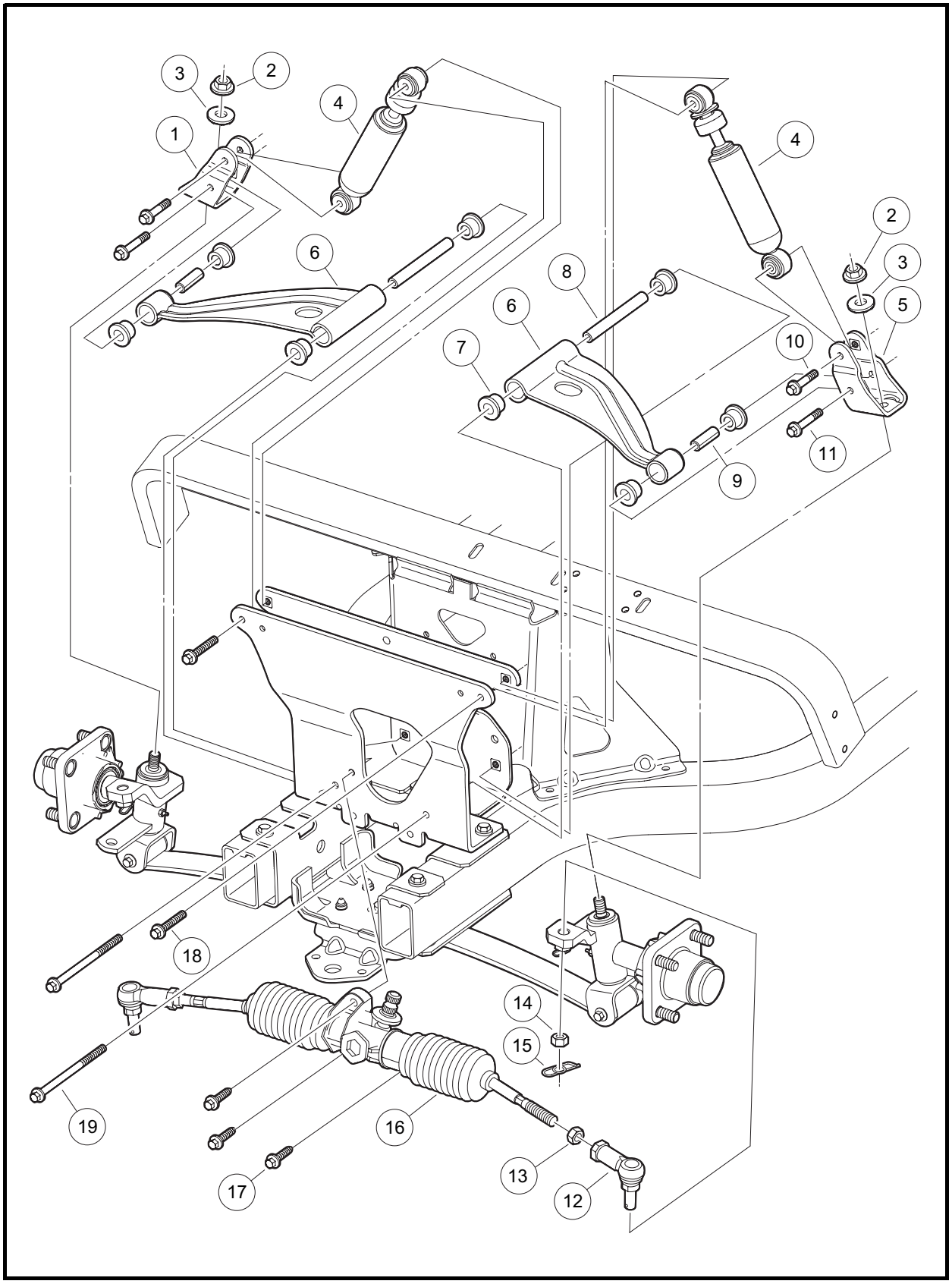

Figure 7-18 Upper Front Suspension Assembly

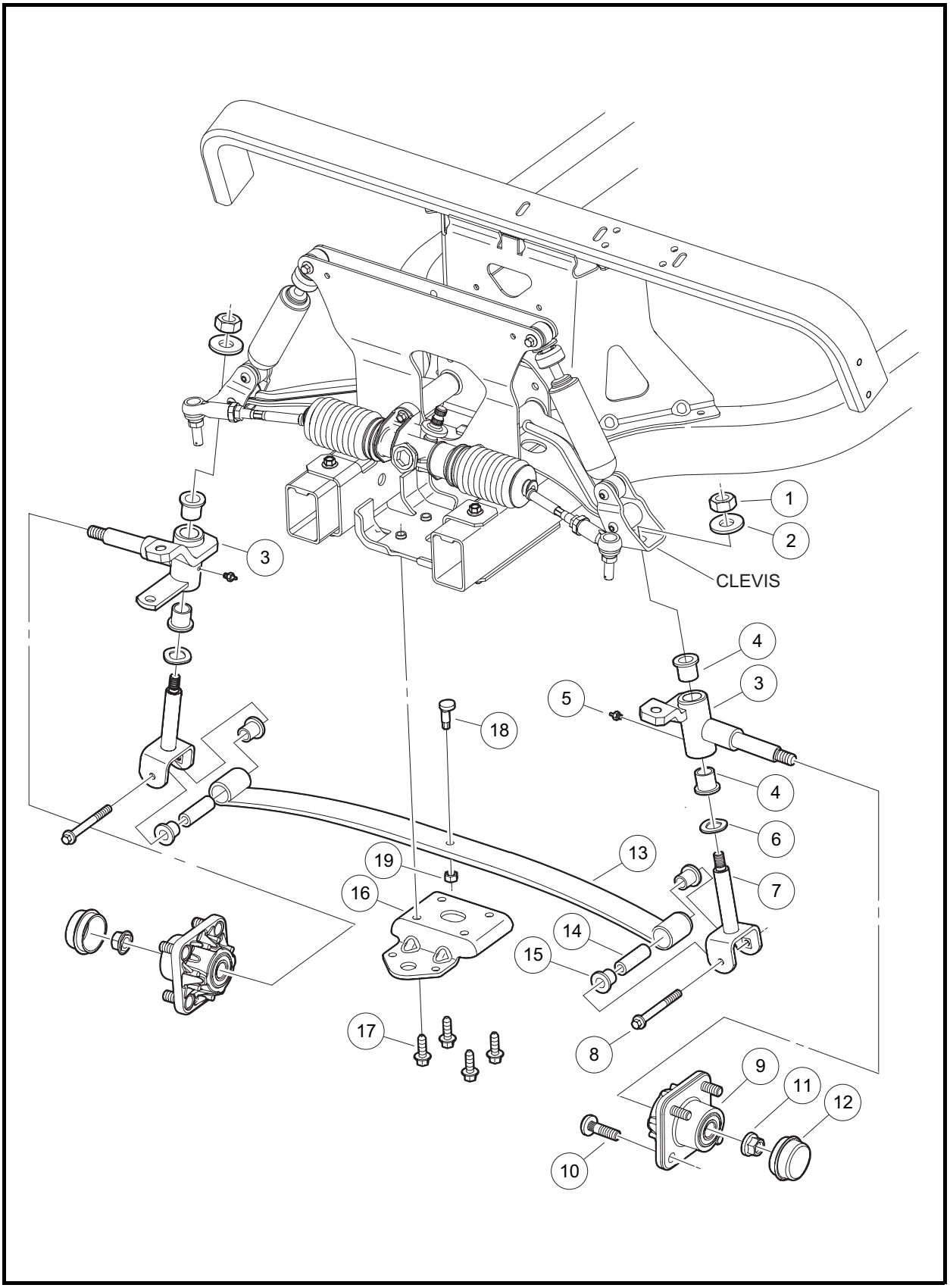

Figure 7-19 Lower Front Suspension Assembly

FRONT WHEEL BEARINGS AND HUBS

See General Warnings, Section 1, Page 1-1.

NOTE: *The front wheel bearings are pressed into the spindle and are not serviceable. If excessive free-play is detected the entire hub should be replaced.*

FRONT WHEEL FREE PLAY INSPECTION

1. Raise the front of the vehicle.
2. Use your hands to attempt to rock the wheel and hub assembly back and forth on the spindle. Movement of the wheel and hub on the spindle indicates that the hub bearing is worn; therefore, the hub assembly must be replaced. **See Front Hub Removal on page 7-17.**

FRONT HUB REMOVAL

1. Remove the front wheels. **See Wheel Removal, Section 8, Page 8-1.**
2. Remove dust cap (12) and lock nut (11) **(Figure 7-19, Page 7-16)**.
3. Slide the hub assembly (9) off of the spindle shaft (3).
4. Lightly sand spindle shaft to clean away any light rust.
5. Inspect the surface of the spindle shaft for surface damage. It should be clean and smooth. If severe pitting from rust or corrosion has occurred, replace the spindle assembly. **See Kingpin and Steering Spindle Removal on page 7-13.**

HUB INSTALLATION

1. Clean and apply a light coat of anti-seize lubricant to the spindle shaft (3).
2. Slide the hub assembly (9) onto the spindle shaft **(Figure 7-19, Page 7-16)**.
3. Install a new flanged lock nut (11) and tighten to 36 ft-lb (50 N·m).
4. Rotate the hub. The hub should rotate smoothly without binding, side play, or any indication of rough spots during rotation.
5. Install the dust cap (12) using a rubber mallet and tapping lightly around the edge of the cap.
6. Repeat the procedure for the opposite wheel.
7. Install wheels and finger-tighten lug nuts.
8. Lower the vehicle and finish tightening lug nuts, using a crisscross pattern, to 55 ft-lb (74.6 N·m).

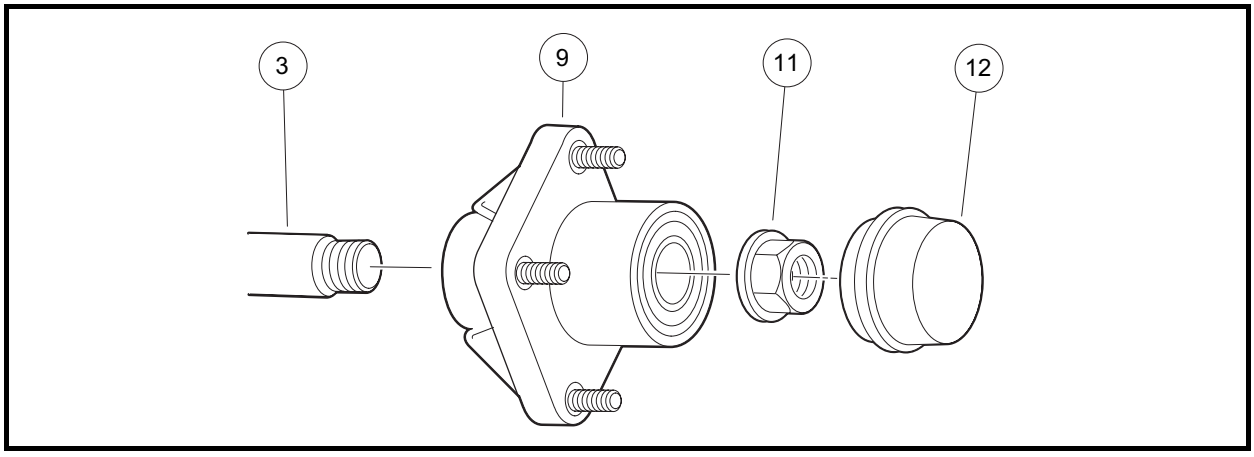

Figure 7-20 Front Wheel Hub

SECTION 8 – WHEELS AND TIRES

⚠ DANGER

- **See General Warnings, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warnings, Section 1, Page 1-1.**

GENERAL INFORMATION

Maximum tire life and good vehicle handling qualities are directly related to proper wheel and tire care.

- Keep tires properly inflated. **See Section 2 – Vehicle Specifications.**
- Keep lug nuts properly tightened.
- Keep the front end aligned and adjusted.

⚠ WARNING

- **Tires affect vehicle handling. When selecting a replacement tire, use only original equipment or comparable tires.**

WHEELS

See General Warnings, Section 1, Page 1-1.

WHEEL REMOVAL

1. Slightly loosen the lug nuts on the wheel to be removed.
2. Raise the end of the vehicle from which the wheel is to be removed. Make sure that the wheels are off the ground. **See General Warnings, Section 1, Page 1-1.**
3. Remove the lug nuts and remove the wheel.

WHEEL INSTALLATION

1. Install wheel(s) and tighten the lug nuts, using a crisscross pattern, until they are snug.
2. Lower the vehicle and finish tightening lug nuts, using a crisscross pattern, to 55 ft-lb (74.6 N·m).

TIRES

See General Warnings, Section 1, Page 1-1.

TIRE REMOVAL

NOTE: *Tire must be removed or installed from the valve stem side of the rim.*

1. Remove the tire and wheel assembly from the vehicle as instructed above.
2. Remove the valve cap and valve core and allow air to escape from the tire.
3. If possible, use a tire machine to remove the tire from the rim.
   3.1. If a tire machine is not available, loosen both tire beads by applying pressure to the tire side walls and pushing the tire bead away from the rim flange and into the rim well **(Figure 8-1, Page 8-2, Detail A)**.
   3.2. With the valve stem side of the wheel up, use a tire tool to carefully start the upper bead over the edge of the wheel rim (**Figure 8-1, Page 8-2, Detail B)**.

CAUTION

- **To avoid damage to the tire, do not use excessive force when starting the bead over the edge of the rim.**

   3.3. When top bead is free of the rim, pull the bead from the bottom side of the rim up into the upper part of the rim well. Insert the tire tool under the lower bead as shown (**Figure 8-1, Page 8-2, Detail C)** and carefully pry the lower bead over the rim flange.
   3.4. Once the lower bead is started over the rim flange, the tire can be removed from the rim by hand.

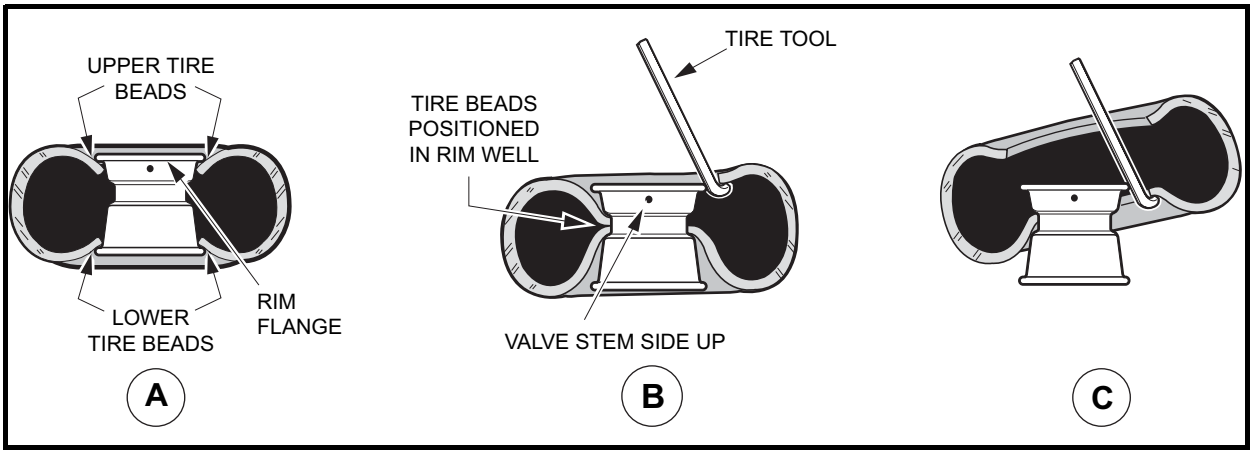

Figure 8-1 Tire Removal

TIRE REPAIR

1. Determine the location and cause of the air leak:
   1.1. Remove the wheel. **See Wheel Removal on page 8-1.** Inflate the tire to no more than 20 psi (1.38 Bars).
   1.2. Immerse the tire in water and then mark the point where bubbles are formed by escaping air.
   1.3. Determine the cause of the air leak. **See following NOTE.**

NOTE: *An air leak could be due to a punctured casing, faulty valve core, improperly seated valve stem, or improperly seated tire bead.*

Small holes in the casing can be plugged using a standard automotive tubeless tire repair kit available at your local Club Car dealer.

2. When the cause of the air leak has been determined, remove tire from the rim and repair as required. **See Tire Removal on page 8-2.**

TIRE INSTALLATION

⚠ WARNING

- **While mounting or inflating tire, keep hands, fingers, etc. from exposed areas between the tire bead and rim.**

1. Clean both tire beads to remove dirt or other foreign matter.
2. Where the tire beads seat, clean the wheel rim with a wire brush. Wipe away any debris with a clean cloth.

NOTE: *Because tubeless tires require a perfect seal in order to seat, keeping the tire and rim clean is very important.*

3. Apply a liberal amount of tire-mounting lubricant (soap and water solution) to both tire beads and rim flanges.
4. Install the tire on the rim from the valve stem side. If there is no tire machine available, use a rubber mallet and tire iron.
5. Remove the valve core, and position tire so that both beads are on the rim flange narrow bead seats.
6. Place tire and wheel assembly against wall in upright position and push it against wall while inflating tire to 30-35 psi (2.07-2.42 Bars). The three-point contact (wall, floor, and hand) will help ensure that beads snap into place and form a proper seal as tire is inflated **(Figure 8-2, Page 8-4)**. **See following WARNING.**

⚠ WARNING

- **Do not use a compressed air source with pressure over 100 psi (6.90 Bars). Due to low pressure requirements of a small tire, over-inflation could be reached almost instantly with a high pressure air supply. Over-inflation could cause tire to explode, possibly resulting in severe personal injury.**

7. Quickly remove the air nozzle and install the valve core.
8. Adjust air pressure in tire to recommended pressure. **See Section 2 – Vehicle Specifications.**
9. Immerse the wheel and tire assembly in water to make sure there are no leaks.

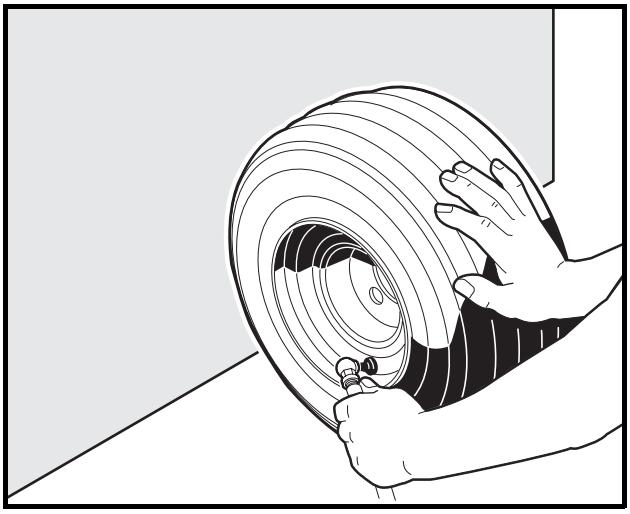

Figure 8-2 Inflate Tire

SECTION 9 – REAR SUSPENSION

⚠ DANGER

- **See General Warnings, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warnings, Section 1, Page 1-1.**

GENERAL INFORMATION

The rear suspension of the Precedent vehicle is completely independent. It consists of two leaf springs controlled by two shock absorbers mounted between the springs and the vehicle frame.

SHOCK ABSORBERS

See General Warnings, Section 1, Page 1-1.

SHOCK ABSORBER REMOVAL AND INSPECTION

1. Check shock absorbers (7) for damage or fluid leakage at the point where the shaft enters the shock absorber body. Replace damaged or leaking shock absorbers **(Figure 9-1, Page 9-2 or Figure 9-4, Page 9-5)**.
2. To remove a shock absorber, remove the nut (5), cup washer (9) and rubber bushings (10) from the stem at the top of the shock absorber.
3. Remove the nut (5), cup washer (9), and rubber bushings (10) from lower mounting stem.
4. Compress the shock absorber to remove it.

SHOCK ABSORBER INSTALLATION

1. To install, reverse the removal procedure.
2. On the upper and lower shock absorber mounting stems, tighten the nuts until the rubber bushing expands to the size of the cup washer.

LEAF SPRINGS (TWO-PASSENGER VEHICLES)

See General Warnings, Section 1, Page 1-1.

LEAF SPRING REMOVAL (TWO-PASSENGER VEHICLES)

1. Loosen, but do not remove, lug nuts on tire and wheel assembly on the side from which the spring is to be removed. Place chocks at the front wheels and lift the rear of the vehicle with a chain hoist or floor jack. Position jack stands under the frame crossmember forward of the spring mounting tabs. Lower the vehicle to let the jack stands support the vehicle **(Figure 9-2, Page 9-3)**. **See following WARNING**.

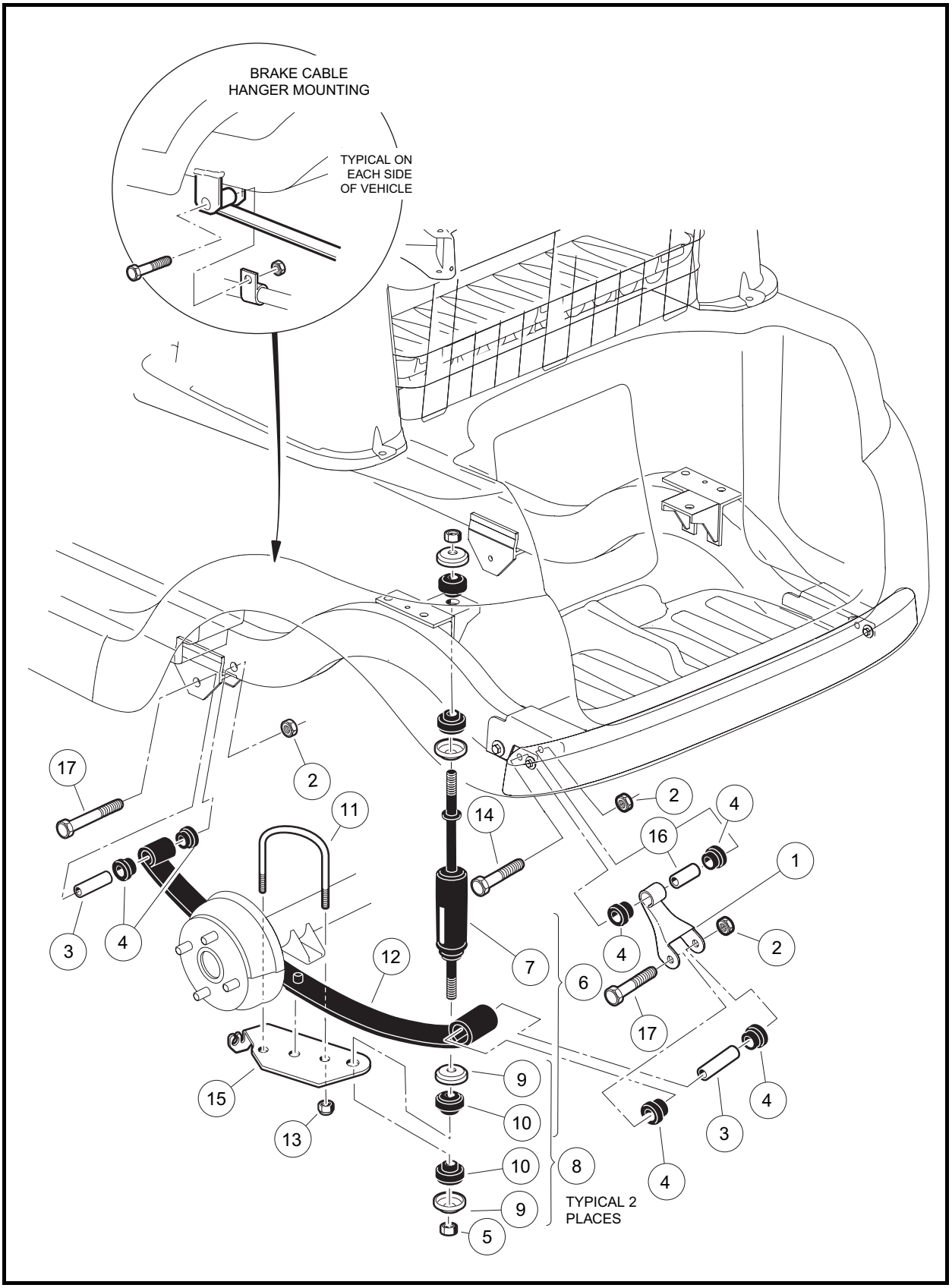

Figure 9-1 Rear Suspension Assembly and Mounting (Two-Passenger Vehicles)

Leaf Spring Removal (Two-Passenger Vehicles), Continued:

⚠ WARNING

- **Lift only one end of the vehicle at a time. Use a suitable lifting device (chain hoist or hydraulic floor jack) with 1000 lb. (454 kg) minimum lifting capacity. Do not use lifting device to hold vehicle in raised position. Use approved jack stands of proper weight capacity to support the vehicle and chock the wheels that remain on the floor. When not performing a test or service procedure that requires movement of the wheels, lock the brakes.**

2. Place a floor jack under the transaxle differential casing to support, but not lift, the drivetrain. Raise it just enough to relieve tension on the shock absorbers without compressing them.
3. Remove the tire and wheel assembly on the side from which the spring is to be removed.
4. Remove the bow tie locking pin (1) and the clevis pin (2) at the brake lever and brake cable connection, and remove cable end (3) from the brake lever **(Figure 9-3, Page 9-3)**. Detach the brake cable from the shock mount bracket (4)**.**
5. Remove the nut (5), cup washer (9), and rubber bushings (10) from the lower mounting stem of the shock absorber **(Figure 9-1, Page 9-2)**.
6. Remove the nuts (13) and the U-bolt (11) securing the spring to the transaxle. Remove the shock mount bracket (15) and the U-bolt.
7. Remove the bolt (17) and nut (2) attaching the rear of the spring to the shackle (1).
8. Remove the nut (2) and bolt (17) attaching the front of the spring to the vehicle frame and remove the spring.
9. Inspect the bushings (4) and sleeves (3) in the spring eyes and replace them if they are worn or damaged.

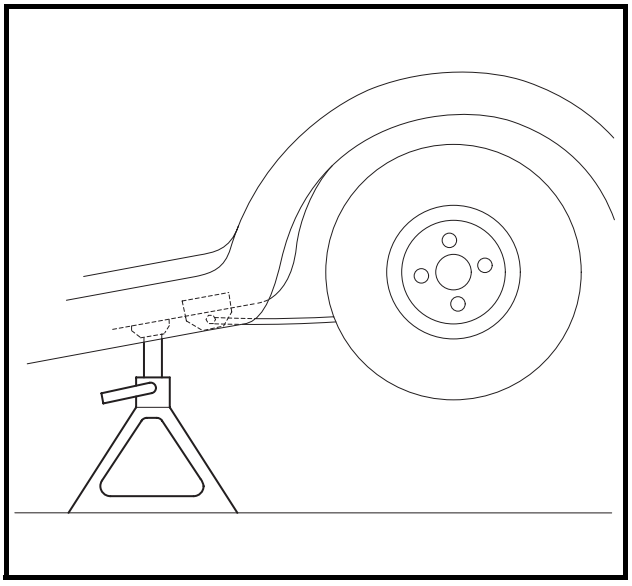

Figure 9-2 Support Vehicle on Jack Stands

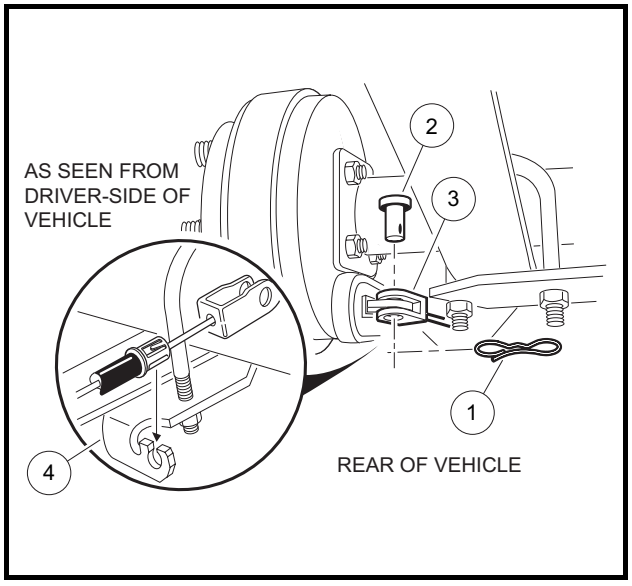

Figure 9-3 Disconnect Brake Cable

LEAF SPRING INSTALLATION (TWO-PASSENGER VEHICLES)

1. To install the springs, reverse the removal procedure. **See following CAUTION.**

⚠ CAUTION

- **When positioning the spring on the transaxle, be sure to insert the locating bolt on the spring in the locating hole in the transaxle saddle.**

2. Tighten the nuts on the U-bolts to 25 ft-lb (34 N·m).
3. Tighten nuts (2) on spring mounting bolts (17) to 15 ft-lb (20.3 N·m) **(Figure 9-1, Page 9-2)**.

LEAF SPRINGS (FOUR-PASSENGER VEHICLES)

See General Warnings, Section 1, Page 1-1.

LEAF SPRING REMOVAL (FOUR-PASSENGER VEHICLES)

1. Loosen, but do not remove, lug nuts on tire and wheel assembly on the side from which the spring is to be removed. Place chocks at the front wheels and lift the rear of the vehicle with a chain hoist or floor jack. Position jack stands under the frame crossmember forward of the spring mounting tabs. Lower the vehicle to let the jack stands support the vehicle **(Figure 9-2, Page 9-3)**. **See following WARNING**.

⚠ WARNING

- **Lift only one end of the vehicle at a time. Use a suitable lifting device (chain hoist or hydraulic floor jack) with 1000 lb. (454 kg) minimum lifting capacity. Do not use lifting device to hold vehicle in raised position. Use approved jack stands of proper weight capacity to support the vehicle and chock the wheels that remain on the floor. When not performing a test or service procedure that requires movement of the wheels, lock the brakes.**

2. Place a floor jack under the transaxle differential casing to support, but not lift, the drivetrain. Raise it just enough to relieve tension on the shock absorbers without compressing them.
3. Remove the tire and wheel assembly on the side from which the spring is to be removed.
4. Remove the bow tie locking pin (1) and the clevis pin (2) at the brake lever and brake cable connection, and remove cable end (3) from the brake lever **(Figure 9-3, Page 9-3)**. Detach the brake cable from the shock mount bracket (4)**.**
5. Remove the nut (5), cup washer (9), and rubber bushings (10) from the lower mounting stem of the shock absorber **(Figure 9-4, Page 9-5)**.
6. Remove the nuts (13) and the U-bolt (11) securing the spring and jounce bumper to the transaxle. Remove the shock mount bracket (15), jounce bumper bracket (20), and the U-bolt (11).
7. Remove the bolt (17) and nut (2) attaching the rear of the spring to the shackle (1).
8. Remove the nut (2) and bolt (17) attaching the front of the spring to the vehicle frame and remove the spring.
9. Inspect the bushings (4) and sleeves (3) in the spring eyes and replace them if they are worn or damaged.

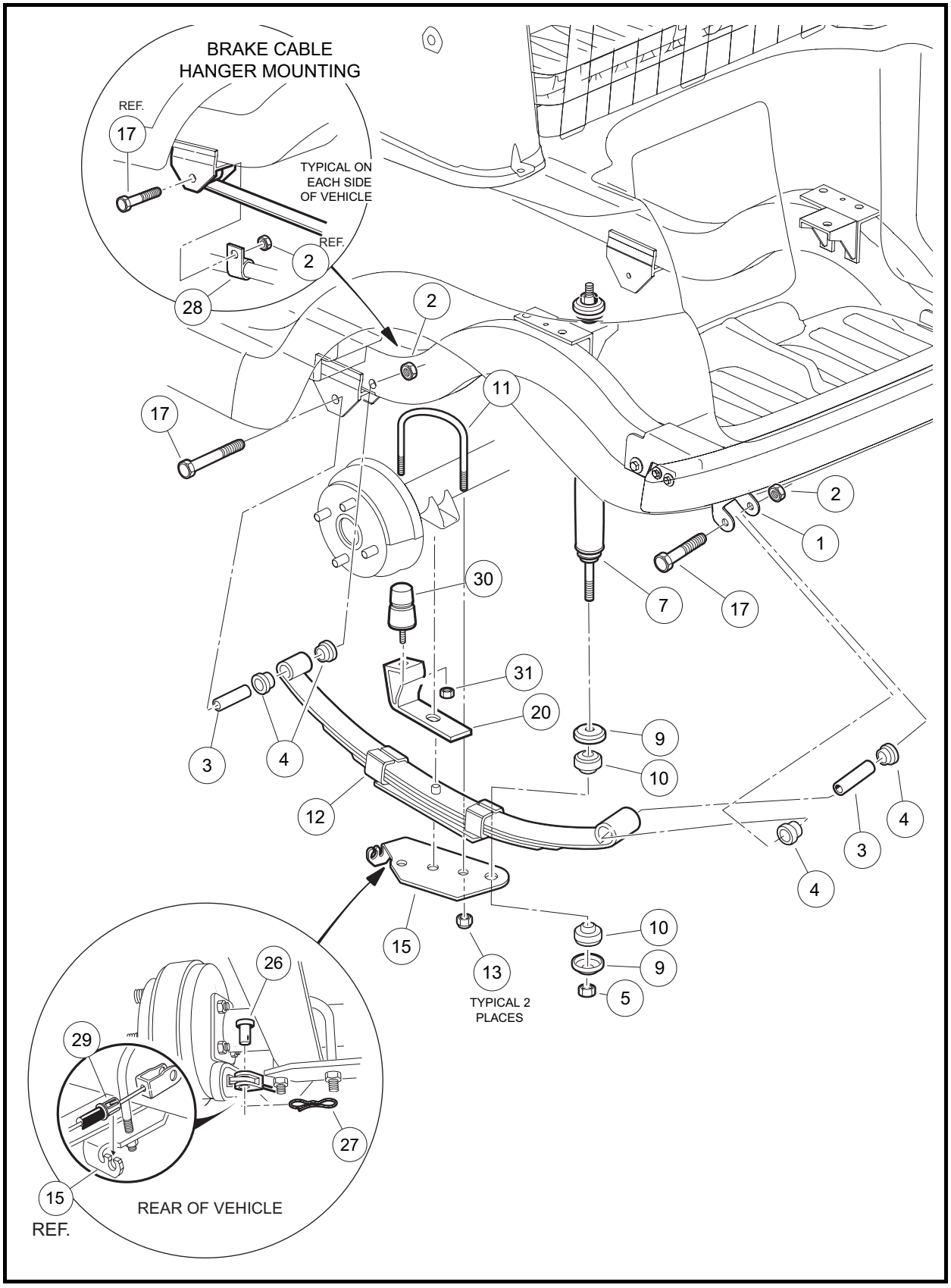

Figure 9-4 Rear Suspension Assembly and Mounting (Four-Passenger Vehicles)

LEAF SPRING INSTALLATION (FOUR-PASSENGER VEHICLES)

1. To install the springs, reverse the removal procedure. **See following CAUTION.**

⚠ CAUTION

- **When positioning the spring on the transaxle, be sure to insert the locating bolt on the spring in the locating hole in the transaxle saddle.**

2. Tighten the nuts on the U-bolts to 25 ft-lb (34 N·m).
3. Tighten nuts (2) on spring mounting bolts (17) to 15 ft-lb (20.3 N·m) **(Figure 9-4, Page 9-5)**.

SECTION 10 – PERIODIC MAINTENANCE

⚠ DANGER

- **See General Warnings, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warnings, Section 1, Page 1-1.**

GENERAL INFORMATION

To ensure trouble-free vehicle performance, it is very important to follow an established preventive maintenance program. Regular and consistent vehicle maintenance can prevent vehicle downtime and expensive repairs that can result from neglect. Any vehicle not functioning correctly should be removed from use until it is properly repaired. This will prevent further damage to the vehicle and avoid the possibility of injury due to unsafe conditions.

Contact your local Club Car distributor/dealer to perform all repairs and semiannual and annual periodic service.

PERIODIC SERVICE SCHEDULE

⚠ WARNING

- **Service, repairs, and adjustments must be made per instructions in the appropriate section of this manual.**

NOTE: *If the vehicle is constantly subjected to heavy use or severe operating conditions, the preventive maintenance procedure should be performed more often than recommended in the periodic service and lubrication schedules.*

Both the Periodic Service Schedule and the Periodic Lubrication Schedule must be followed to keep vehicle in optimum operating condition.

PERIODIC SERVICE SCHEDULE – ELECTRIC VEHICLES

REGULAR INTERVAL	SERVICE	
Daily service by owner	Batteries	Charge batteries (after each daily use only).
Weekly service by owner	Batteries	Check electrolyte level. Add water if necessary. **See Section 13 – Batteries.**
Monthly service by owner or trained technician	Batteries	Wash battery tops and clean terminals with baking soda/water solution. Apply Battery Terminal Protector Spray (CCI P/N 1014305) to battery terminals.
	Tires	Check air pressure and adjust if necessary. **See Section 2 – Vehicle Specifications.**
	General vehicle	Thoroughly wash vehicle including the underside.
Semiannual service by trained technician only (every 50 hours of operation or 100 rounds of golf)	Brake system	Check brake shoes; replace if necessary. **See Section 6 – Wheel Brake Assemblies.**
		Lubricate brake system per Lubrication Schedule. **See Section 6 – Wheel Brake Assemblies.**
		Check brake cables for damage; replace if necessary.
	Electrical wiring and connections	Check for tightness and damage; replace if necessary.
	Front wheel alignment and camber	Check and adjust as required. **See Section 7 – Steering and Front Suspension.**
Annual service by trained technician only (every 100 hours of operation or 200 rounds of golf)	Batteries	If batteries are not performing as expected, see **See Section 13 – Batteries.**
	Pedal group	Lubricate all rotating joints. **See Periodic Lubrication Schedule on page 10-3.**
	General Vehicle	Check for loose hardware; tighten if necessary.

⚠ WARNING

- **If any problems are found during scheduled inspection or service, do not operate the vehicle until repairs are made. Failure to make necessary repairs could result in fire, property damage, severe personal injury, or death.**

PERIODIC LUBRICATION SCHEDULE

See General Warnings, Section 1, Page 1-1.

PERIODIC LUBRICATION SCHEDULE

REGULAR INTERVAL	SERVICE	LUBRICATION POINT	RECOMMENDED LUBRICANT
Semiannually by owner or trained technician (every 50 hours of operation or 100 rounds of golf)	Charger receptacle	1	WD-40
	Brake system, per maintenance and service manual.	2	Dry Moly Lube (CCI P/N 1012151), white lithium grease NLGI #2
	Front suspension (two fittings)	3	Chassis Lube - EP NLGI Grade 2
Annually by trained technician only (every 100 hours of operation or 200 rounds of golf)	Check/fill transaxle to plug level	4	22 oz. (0.67 liters) SAE 30 WT. API Class SE, SF, or SG Oil (or higher)
	Pedal group	5	Dupont™ Performance Dry Multi-Use Lubricant

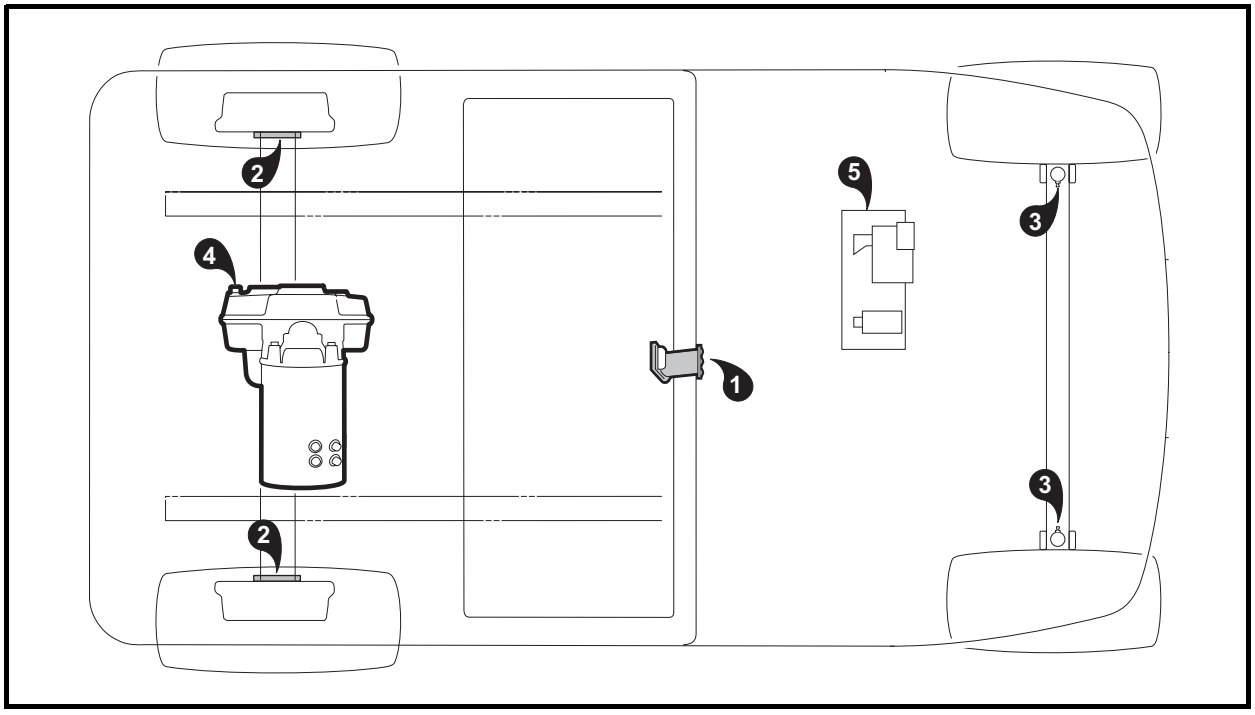

Figure 10-1 Vehicle Lubrication Points

SECTION 11 – ELECTRICAL SYSTEM AND TESTING

⚠ DANGER

- **See General Warnings, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warnings, Section 1, Page 1-1.**
- **Shorting of battery terminals can cause personal injury or death.**
  - **Do not place component mounting plate directly on top of batteries when removing or installing plate.**
  - **Remove plate from vehicle completely.**

GENERAL INFORMATION

The IQ System vehicle uses a 48-volt electrical system that is powered by four 12-volt lead-acid batteries and includes an onboard computer. The IQ System vehicle uses a shunt-wound 3.2 hp motor and includes several additional features.

- **Shunt-Wound Motor:** The shunt-wound motor, unlike a series motor, is designed so that the speed controller is able to vary the amount of current passing through the field coils independently from the current passing through the armature.
- **Motor Braking:** Under certain conditions a shunt-wound motor also has the ability to act as an electrical brake to slow the vehicle. There are three features of the IQ electrical system which will activate the motor braking function: Zero Speed Detect, Pedal Down Motor Braking, and Pedal Up Motor Braking (adjustable with the IQDM-P handset).
- **Zero Speed Detect:** This prevents the vehicle from rolling away uncontrolled should the driver park on a slope and leave the vehicle without locking the park brake. The vehicle will roll at about 1 mph (1.6 km/h). If the zero speed detect function remains engaged for two seconds or more, a warning buzzer will sound to alert the driver that motor braking has been activated.

⚠ WARNING

- **Zero-Speed Detect will not limit vehicle speed to 1 mph (1.6 km/h) on very steep grades. Do not operate vehicle on slopes exceeding 20% grades.**

- **Pedal Down Motor Braking:** This feature helps to control vehicle downhill speed. Motor braking is activated when the vehicle reaches the programmed top speed and holds the vehicle at that speed. Motor braking is automatically disengaged when vehicle speed slows below the programmed top speed.

(continued on page 11-7)

WIRING DIAGRAMS

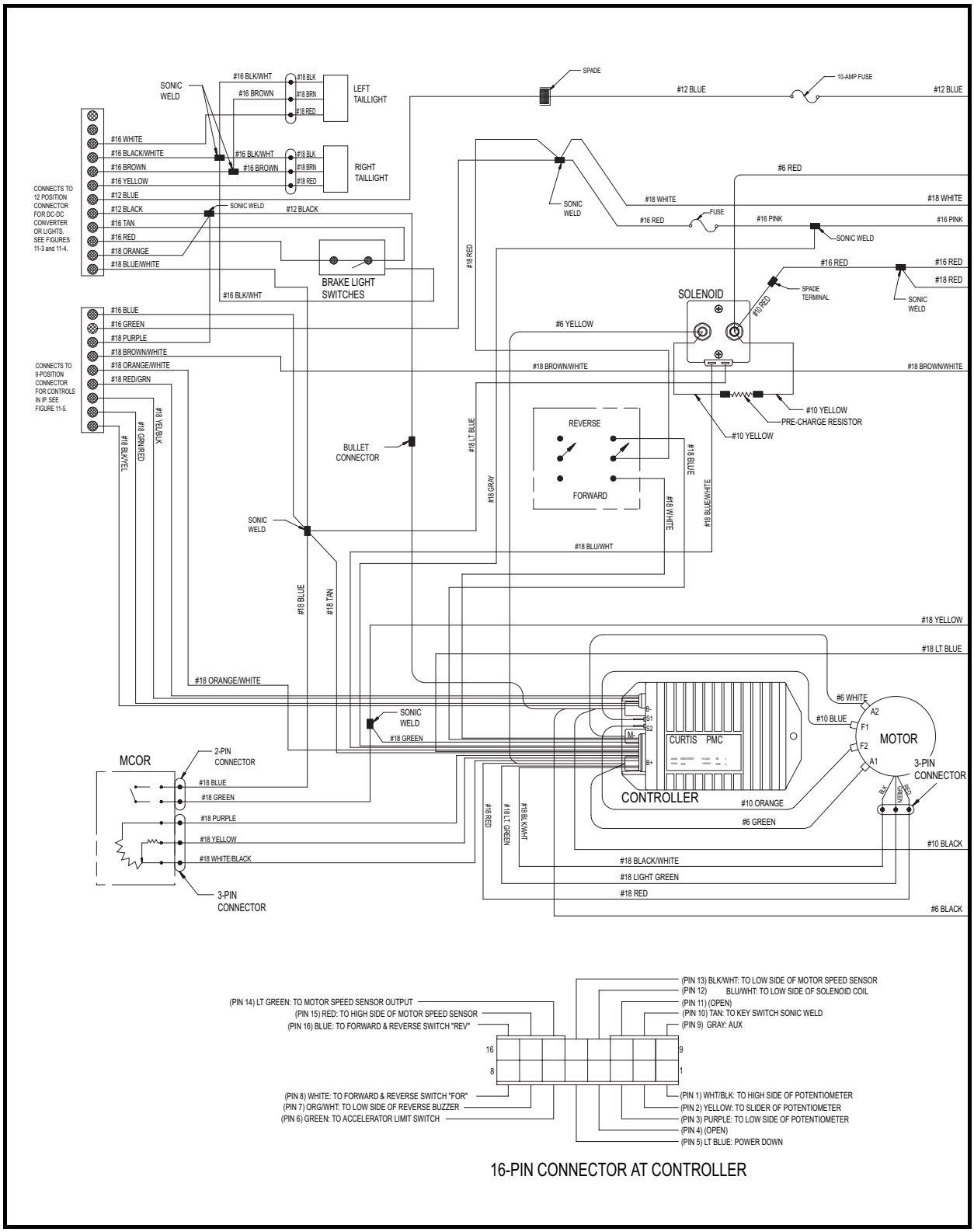

Figure 11-1 Precedent Electric Vehicle Wiring Diagram

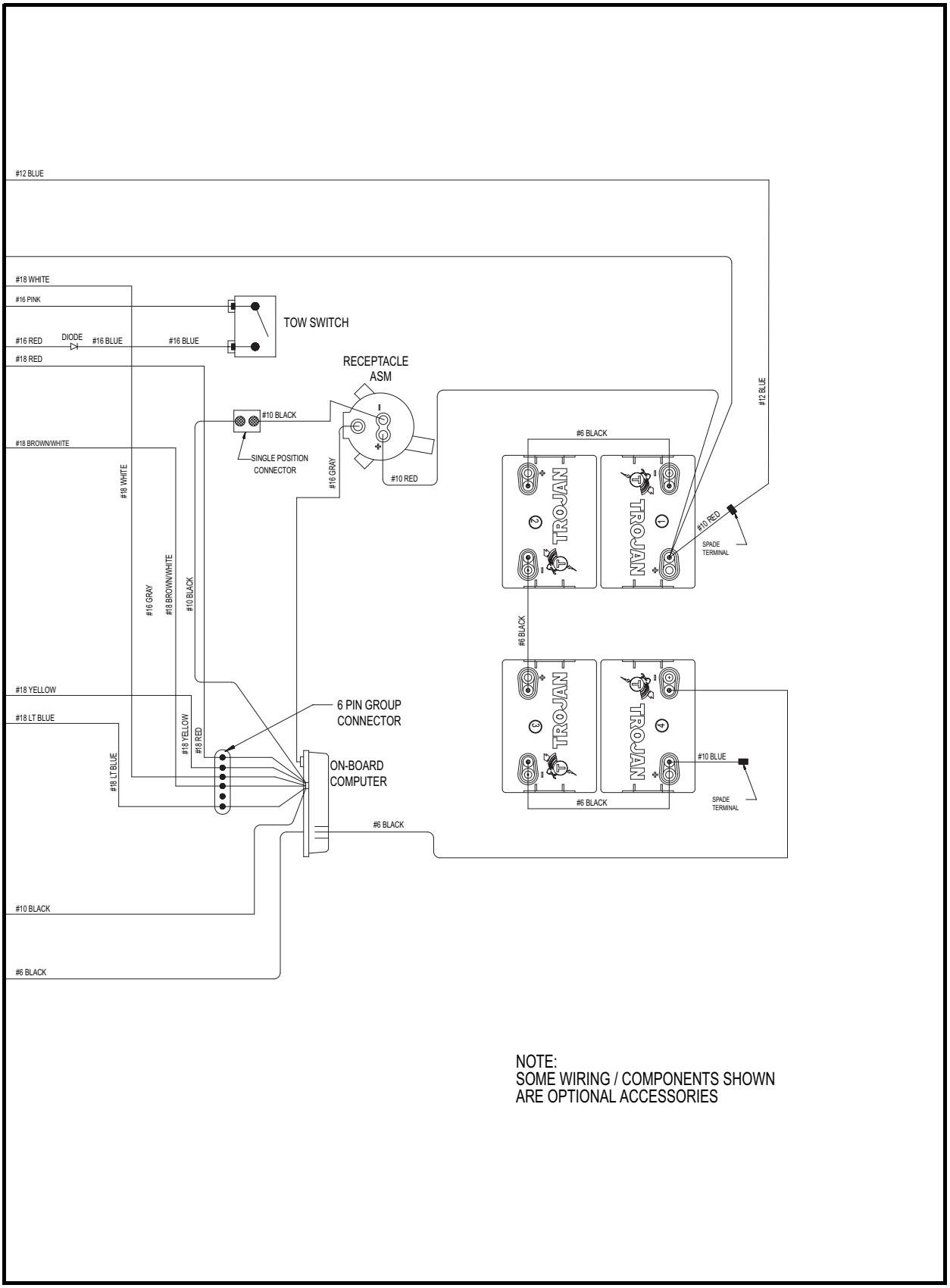

Figure 11-2 Precedent Electric Vehicle Wiring Diagram

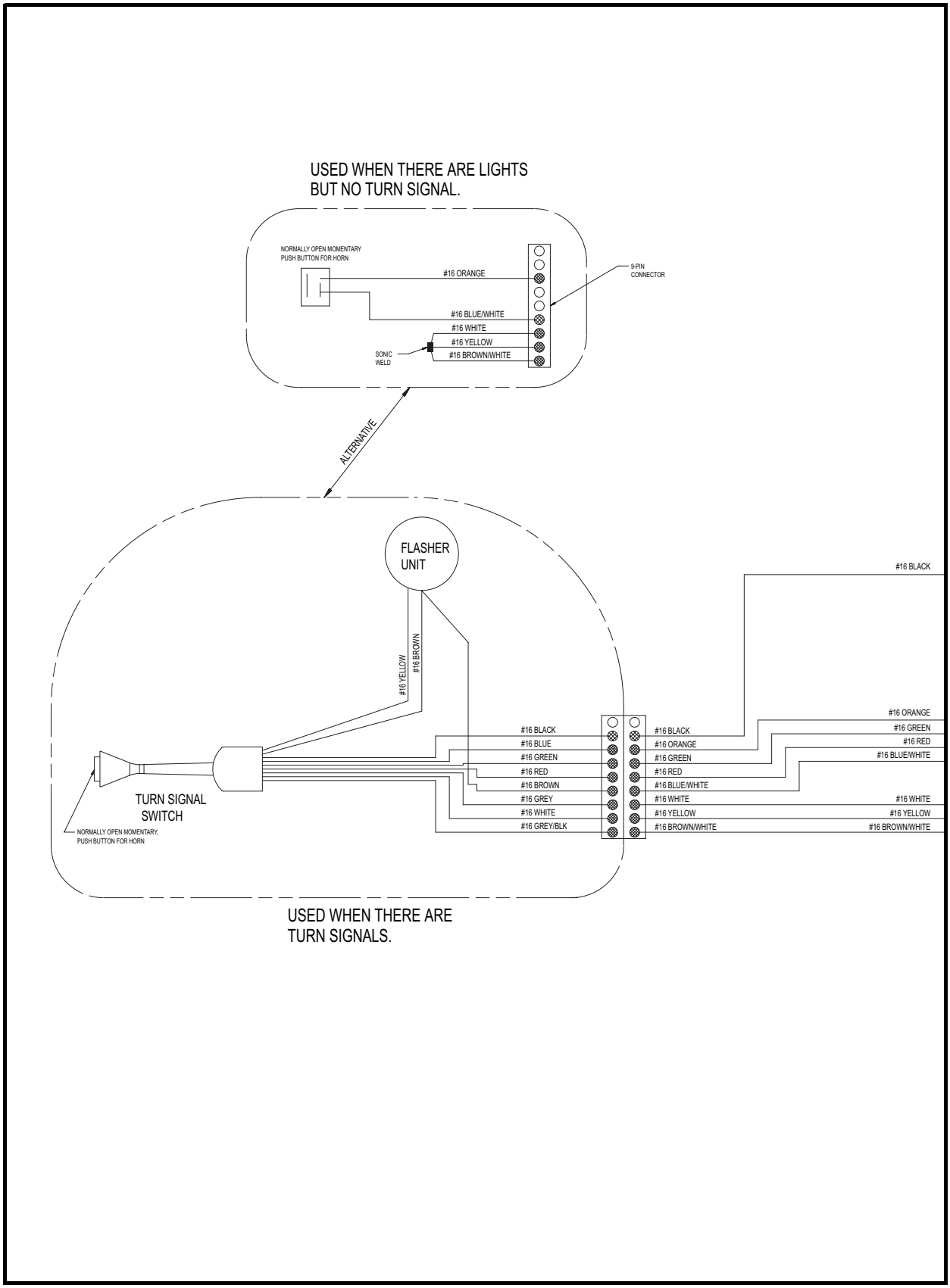

Figure 11-3 Precedent Electric Vehicle Accessory Wiring Diagram

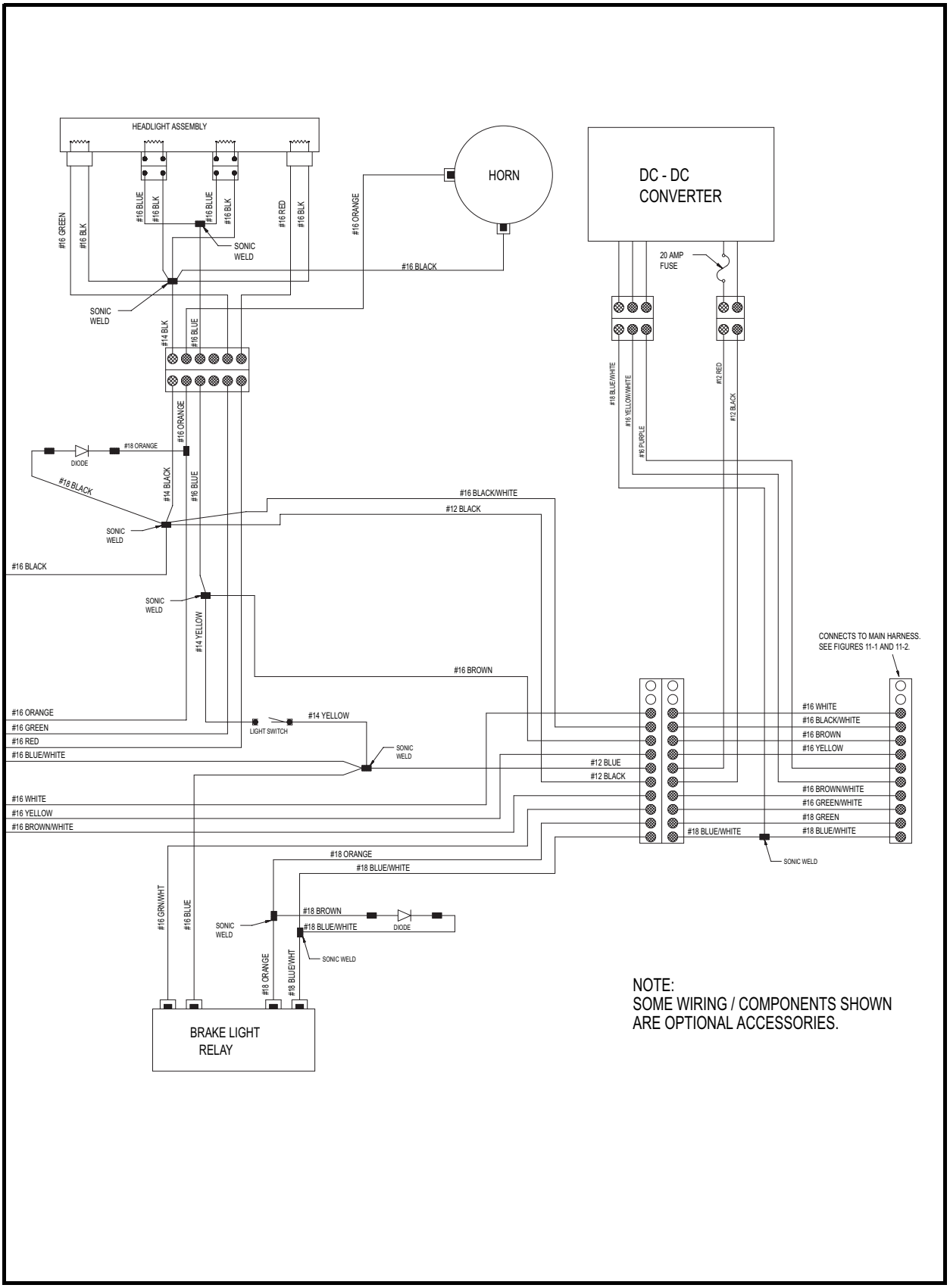

Figure 11-4 Precedent Electric Vehicle Accessory Wiring Diagram

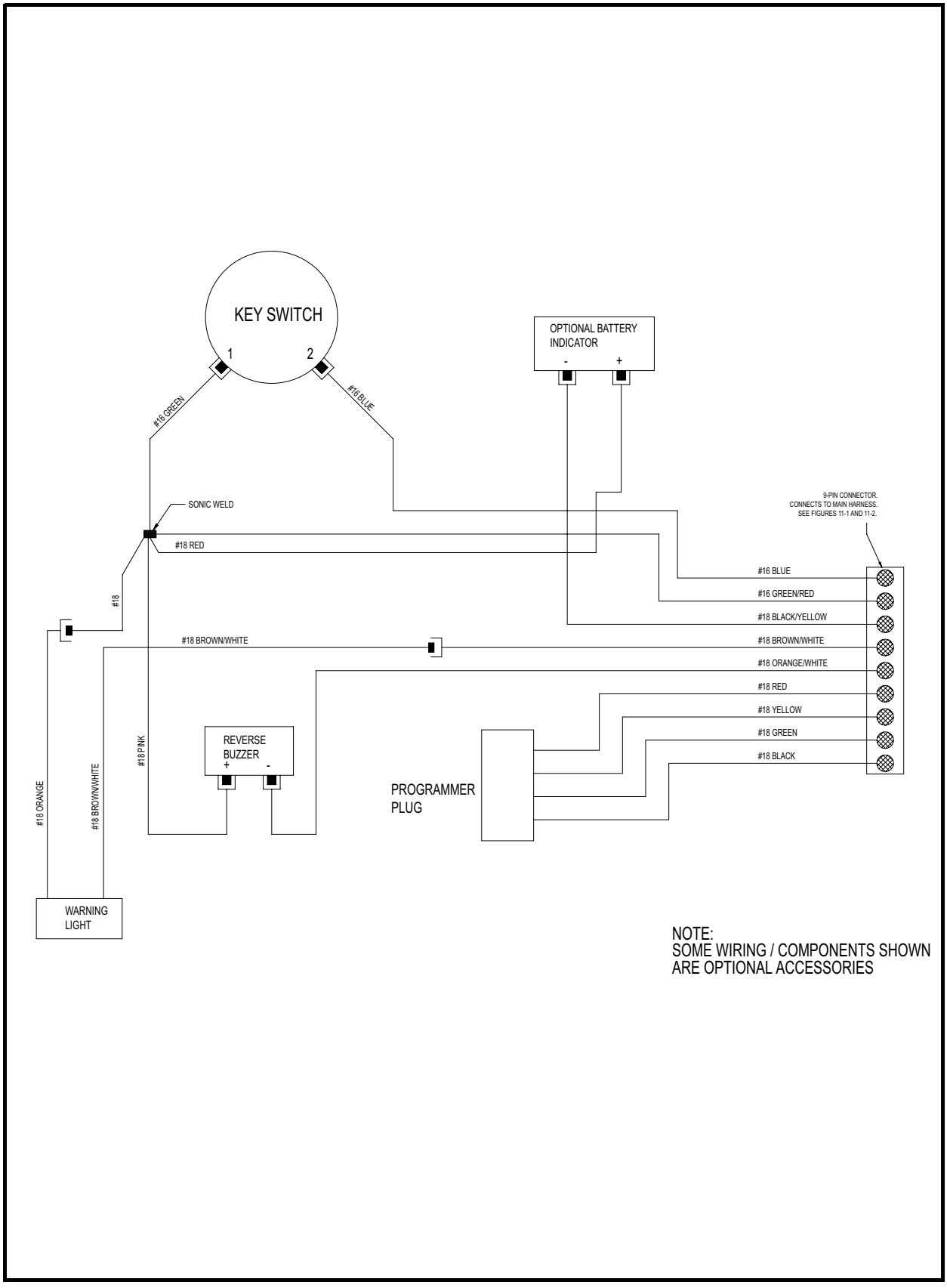

Figure 11-5 Precedent Electric Vehicle Instrument Panel Wiring Diagram

General Information, Continued:

- **Pedal Up Motor Braking:** When vehicle speed is above 11 mph (17.7 km/h), releasing the accelerator pedal will activate motor braking, which slows the vehicle speed. Once vehicle speed slows to below approximately 11 mph (17.7 km/h), with the accelerator pedal still released, motor braking will be deactivated and the vehicle will coast freely. This feature is selectable. Contact your Club Car dealer/distributor to inquire about this selectable feature.
- **Regenerative Braking**: When motor braking is activated, the vehicle motor acts as a generator, slowing the vehicle as it creates energy that is used to charge the batteries.
- **Tow/Run Switch:** When the Tow/Run switch is in the RUN position, the vehicle will function normally. When the switch is in the TOW position, power to the OBC and controller is shut off, disabling the vehicle operating circuit and zero speed detect, allowing the vehicle to be towed.
- **Motor Protection Circuit:** The operator should never attempt to hold the vehicle on an incline by pressing the accelerator pedal instead of the brake pedal, as motor overheating could result. By reducing the current to the motor during such an occurrence, the motor protection circuit reduces the possibility of motor damage. When this situation arises, a *motor stall fault* is recorded by the speed controller and will be displayed on an IQDM handset in the Diagnostic History menu. **See the IQDM Owner's Manual.**
- **High Pedal Detect:** This function prevents unexpected vehicle movement if the key switch is turned ON after the accelerator is pressed, or the accelerator pedal is pressed when Forward/Reverse switch is used to change the direction of travel. The vehicle will not move until the accelerator is released and pressed again. When this situation arises, a *HPD fault* is recorded by the speed controller and will be displayed on an IQDM handset in the Diagnostic History menu. **See the IQDM Owner's Manual.**
- **Onboard Computer (OBC):** The OBC, 1) monitors battery condition, 2) monitors the number of energy units used by the vehicle, 3) determines the number of energy units required to recharge the batteries and shuts the charger off when this number is reached, 4) determines when to activate regenerative motor braking, 5) locks out vehicle movement while the charger is plugged into the vehicle charger receptacle, 6) stores operating data, which can be read by the Communication Display Module (CDM). **See Communication Display Module (CDM) on page 11-38.**

TROUBLESHOOTING

The following troubleshooting guides will be helpful in identifying operating difficulties should they occur. The guides include the symptom, probable cause(s) and suggested checks. The procedures used in making these checks can be found in the referenced sections of this maintenance and service manual.

TROUBLESHOOTING THE VEHICLE WITH THE IQDM

Club Car recommends the use of the IQDM handset for troubleshooting vehicles equipped with the IQ electrical system. Troubleshooting Guide 1 is to be used in conjunction with the IQDM handset. Refer to the IQDM Owner's Manual for operating instructions. **See following WARNING.**

⚠ WARNING

- **The vehicle operator should not monitor the IQDM while the vehicle is in motion. A technician can monitor the IQDM while traveling as a passenger in the vehicle. Failure to heed this warning could result in severe personal injury or death.**

In the event that the vehicle is not functioning properly after completing Troubleshooting Guide 1, the technician should proceed to Troubleshooting Guide 2.

If an IQDM handset is unavailable, the technician should proceed to Troubleshooting Guide 2.

TROUBLESHOOTING GUIDE 1

The following troubleshooting guide is intended for use with an IQDM handset. For IQDM operating instructions, refer to the IQDM Owner's Manual. **See following NOTE.**

NOTE: *Before troubleshooting the vehicle, check the diagnostic history from the Special Diagnostics Menu. Note any fault codes.*

TROUBLESHOOTING GUIDE 1

SYMPTOM	POSSIBLE CAUSES	CORRECTIVE ACTION
Test Menu – THROTTLE % value does not increase as the accelerator pedal is pressed **or** **Diagnostic Menu – THROTTLE FAULT 1 fault code**	Loose or disconnected three-pin connector at the MCOR or broken wire	Repair and/or connect the three-pin connector to the MCOR
	Loose or disconnected 16-pin connector at speed controller or broken wire	Repair and/or connect the 16-pin connector to the speed controller
	Failed MCOR	Test Procedure 4 – MCOR Voltage on page 11-17
Test Menu – HEATSINK °C indicates that temperature is above 85 °C (145 °F) **or** **Diagnostic Menu – THERMAL CUTBACK fault code**	Over-adjusted brakes	Section 6 – Wheel Brake Assemblies in the appropriate maintenance and service manual
	Vehicle is over-loaded	Ensure that vehicle is not over-loaded before returning to operation
Test Menu – ARM PWM value does not reach 100% when vehicle is at full speed	Failed MCOR	Test Procedure 4 – MCOR Voltage on page 11-17
Test Menu – SPEED PULSES menu item indicates that speed pulses are OFF when the vehicle is in motion **or** **Diagnostic Menu – SPEED SENSOR fault code**	Loose or disconnected motor speed sensor or broken wire	Repair and/or connect the three-pin connector to the motor speed sensor
	Loose or disconnected 16-pin connector at speed controller or broken wire	Repair and/or connect the 16-pin connector to the speed controller
	Failed motor speed sensor	Test Procedure 13 – Motor Speed Sensor on page 11-34
Test Menu – FOOT INPUT menu item indicates that the MCOR internal limit switch is always ON or always OFF.	Loose or disconnected two-pin connector at the MCOR or broken wire	Repair and/or connect the two-pin connector to the MCOR
	Loose or disconnected 16-pin connector at speed controller or broken wire	Repair and/or connect the 16-pin connector to the speed controller
	Failed MCOR	Test Procedure 8 – Key Switch and MCOR Limit Switch Circuit on page 11-20
Test Menu – FORWARD INPUT and/or REVERSE INPUT does not indicate the correct reading **or** **Diagnostic Menu – PROC/WIRING fault code**	Loose or disconnected Forward/Reverse rocker switch (quick disconnect terminals) or broken wire	Repair and/or connect the quick disconnect terminals to the Forward/ Reverse switch
	Loose or disconnected Forward/Reverse rocker switch (three-pin connector) or broken wire	Repair and/or connect the three-pin connector from the Forward/Reverse switch to the wire harness
	Loose or disconnected 16-pin connector at speed controller or broken wire	Repair and/or connect the 16-pin connector to the speed controller
	Failed Forward/Reverse rocker switch	Test Procedure 15 – Forward/Reverse Rocker Switch on page 11-36
Troubleshooting Guide continued on next page...		

TROUBLESHOOTING GUIDE 1

SYMPTOM	POSSIBLE CAUSES	CORRECTIVE ACTION
Test Menu – MAIN CONT (solenoid) does not indicate ON when the solenoid should be activated. **or** **Diagnostic Menu – MAIN CONT DNC (main contactor (solenoid) did not close) fault code**	Speed controller logic malfunction	Disconnect the batteries and allow the speed controller capacitors to discharge. **See WARNING "To avoid unintentionally starting..." in General Warnings, Section 1, Page 1-2.** Reconnect the batteries and see if the symptom returns.
	Loose, broken, or disconnected wire(s) at solenoid or B+ speed controller terminal	Repair and/or connect the loose or disconnected wire(s)
	Loose or disconnected 16-pin connector at speed controller or broken wire	Repair and/or connect the 16-pin connector to the speed controller
	Failed solenoid	Replace solenoid. **See Solenoid Removal, Section 12, Page 12-12.**
Test Menu – KEY INPUT does not indicate ON when key switch is in the ON position	Loose or disconnected wires at key switch terminals or broken wire	Repair and/or connect the quick disconnect terminals to the Forward/ Reverse switch
	Loose or disconnected 16-pin connector at speed controller or broken wire	Repair and/or connect the 16-pin connector to the speed controller
	Failed key switch	Test Procedure 8 – Key Switch and MCOR Limit Switch Circuit on page 11-20
Diagnostic Menu – THROTTLE FAULT 1 fault code	Loose or disconnected three-pin connector at the MCOR or broken wire	Repair and/or connect the three-pin connector to the MCOR
	Loose or disconnected 16-pin connector at speed controller or broken wire	Repair and/or connect the 16-pin connector to the speed controller
	Failed MCOR	Test Procedure 4 – MCOR Voltage on page 11-17
Diagnostic Menu – HW FAILSAFE (Hardware Failsafe) fault code	Armature drive FET's (field-effect transistors) inside speed controller have failed	Replace the speed controller. **See Speed Controller Removal, Section 12, Page 12-11.**
	Speed controller logic malfunction	Disconnect the batteries and allow the speed controller capacitors to discharge. **See WARNING "To avoid unintentionally starting..." in General Warnings, Section 1, Page 1-2.** Reconnect the batteries and see if the symptom returns.
Diagnostic Menu – MAIN WELDED (main solenoid contacts welded) fault code	solenoid contacts have failed closed	Replace solenoid. **See Solenoid Removal, Section 12, Page 12-12.**
Diagnostic Menu – MAIN DRIVER ON or MAIN DRIVER OFF fault code	Speed controller logic malfunction	Disconnect the batteries and allow the speed controller capacitors to discharge. **See WARNING "To avoid unintentionally starting..." in General Warnings, Section 1, Page 1-2.** Reconnect the batteries and see if the symptom returns.
	Failure of the FET that controls the solenoid coil	Replace the speed controller. **See Speed Controller Removal, Section 12, Page 12-11.**

Troubleshooting Guide continued on next page...

TROUBLESHOOTING GUIDE 1

SYMPTOM	POSSIBLE CAUSES	CORRECTIVE ACTION
Diagnostic Menu – MAIN COIL FAULT fault code **or** **Diagnostic Menu – MAIN DROPOUT fault code**	Solenoid coil has failed in an open condition	Replace solenoid. **See Solenoid Removal, Section 12, Page 12-12.**
Diagnostic Menu – FIELD MISSING fault code	Loose or disconnected motor field coil wires at motor or speed controller or broken wire	Repair and/or connect the field coil wires
	Failure of the motor field windings	Section 15a – Motor (Model 5BC59JBS6365)
	Failure of the FET's that control field current	Replace the speed controller. **See Speed Controller Removal, Section 12, Page 12-11.**
Diagnostic Menu – HPD (high pedal detect) fault code	Operator error	Train operators to fully remove foot from accelerator pedal before turning key switch to the ON position or changing the selected direction with the Forward/ Reverse switch
Diagnostic Menu – LOW BATTERY fault code	Batteries require charging	Place batteries on battery charger and allow them to fully charge
	Improperly maintained or failed batteries	Section 13 – Batteries
Diagnostic Menu – MOTOR STALL fault code	Operator error	Train operators to use the brake to hold the vehicle on a hill, rather than holding the vehicle on a hill using the accelerator pedal
Diagnostic Menu – OPEN ARMATURE fault code	Loose or disconnected motor armature wires at motor or speed controller or broken wire	Repair and/or connect the motor armature wires
	Failure of the motor armature or brushes	Section 15a – Motor (Model 5BC59JBS6365)
	Failure of the FET's that control armature current	Replace the speed controller. **See Speed Controller Removal, Section 12, Page 12-11.**